

Contractors *and* Engineers Monthly

Vol. 38, No. 9

SEPTEMBER, 1941

\$2 a Year, 20 Cents a Copy

Highlights Of This Issue

• Defense Work for Navy

The first of a series of four articles on the construction of the new Naval Air Station at Quonset, R. I., describes the dual concrete-batching plants which provided the concrete for many purposes at the Station. One of these plants served the truck mixers while the other was so designed as to provide dry batches for the pavers or to serve the truck mixers. See page 1.

• A 47-Mile Canal Contract

The transformation of some 445,000 acres of California desert into tillable land will be effected by the completion of the Coachella arm of the All-American Canal. A contract for 47 miles of this canal and appurtenant structure is described in this issue. See page 2.

• Highway District Garage

The State Highway Department garage for District 4 in Connecticut, typical of the better district garages in that state, cares for the Department equipment in seven maintenance sections with efficiency and economy. See page 13.

• Friant Dam Concreting

Several of the features of the concreting at Friant Dam in California, including the methods of cooling aggregates, mixing water and concrete, the use of absorptive linings for forms, and the trial use of pumicite in the concrete, are described in this issue. See page 15.

• Dualizing Jersey Route

To widen a heavily traveled state route leading to New Jersey shore resorts, a second lane was constructed, leaving a safety strip between to divide opposing traffic. The contractor for a 5.996-mile section of this work had a well-planned organization and set-up which completed the job with dispatch. See page 19.

• Paving National Airport

The second of two articles on the new National Airport in Washington, D. C., describes the methods of stabilizing the base and laying the asphaltic concrete paving on runways, taxiways and aprons. See page 25.

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Dual Batching Plants For Naval Air Station

DRILLING HARD ROCK IN PENNSYLVANIA



C. & E. M. Photo

For deep holes up to 30 feet, this B-E 6-inch well drill worked in shale where the strata ran at 45 degrees to the hole on A. Guthrie & Co.'s 7.17-mile highway job on U. S. 22 in Pennsylvania. See page 27.

Quonset, R. I., Project Had Many Uses for Concrete Produced by Pavers and Seventeen Truck Mixers

† THE demands for concrete at the great new Naval Air Station at Quonset, R. I., were tremendous and varied, including foundations, hangar floors and aprons among the largest. Some required the placing of a yard or two here and one there, which made the truck mixer the most economical unit, while thousands of yards were needed to pave a large apron area for the hangars. George A. Fuller Co. and Merritt-Chapman & Scott Corp., contractors selected by the Civil Engineering Corps, U. S. Navy, to build this Station with utmost speed, chose truck mixers and 27-E pavers for producing and pouring concrete as most economical and as best fitting the problems.

Old Quonset Point on Narragansett Bay, about 4½ miles north of the new Jamestown Bridge, comprised about 800 acres covered with a heavy growth of small trees, and was generally triangular in shape. This has been transformed into a veritable city and air station, 1,250 acres in extent and approximately square. This was done by filling in 450 acres in the Bay behind an 11,000-foot bulkhead of steel sheet piling by dredging from adjacent borrow areas in the Bay. The average fill was 18 feet, with a maximum of 26 and a minimum of 2. Several knolls within the area were leveled by tractors and bulldozers to fill low spots and one pond.

This great naval reservation, work on which was started in mid July, 1940, is a base for naval air patrol squadrons for the Atlantic Coast and for airplane carriers. This latter requirement has necessitated the construction of a suitable pier with a sufficient depth of water for almost the entire length on either side for docking, and a channel and turning basin of the same depth. The same care and thought shown in the design of barracks, warehouses, hangars, repair shops, runways, and the seaplane ramp by Civil Engineering Corps officers of the U. S. Navy who planned this station has been carried through by the contractors with a well-balanced executive group and a well-chosen construction organization. The first completed projects were turned over to the Navy in April, 1941, when Quonset began its service.

We take this opportunity of expressing our appreciation to the naval authorities and to the contractors for permission to visit the station and to

(Continued on page 10)

Desert Transformed Into Tillable Land

**Morrison-Knudsen Co. and
M. H. Hasler Have Contract
For Coachella Canal in
Southern California**

By FLOYD SUTER BIXBY

(Photo on page 44)

† NOT far from the City of Los Angeles, California, a tract of half a million acres of land has for years lain barren and untouched. North of the Imperial Valley, already famous for its vegetable crops, are 445,000 acres of the Coachella Valley Desert, alive with rattlesnakes and covered with scattered cactus and sagebrush, which will soon quicken with the transfusion of new life when the Coachella arm of the All-American Canal is routed into the thirsty acres. The deep soil of this valley will grow citrus fruits, Arabian dates and green vegetables in profusion, once water is brought to it.

A contract was let by the Bureau of Reclamation in June, 1939, to the Morrison-Knudsen Co., Inc., and M. H. Hasler of Los Angeles for the construction of 47 miles of the main canal and appurtenant structures between Sta. 2,078+16 and Sta. 4,563+37. The canal will bear northward along the giant sand dunes of the Imperial Valley, passing into the Coachella Desert and curving around the Salton Sea. This is the low spot of a prehistoric sink and Imperial Valley land drains naturally northward toward this ancient body of water. Construction of the 47 miles of canal involves the excavation of 11,000,000 cubic yards of material, the construction of 32 concrete siphon structures, 4 automatic spillways, 1 check and 5 drainage inlets. The contract allowed 1,060 calendar days for the completion of the job.

Canal Excavation

The major part of the contract is the excavation of the main canal. At the upper end of the job, that is, the end nearest the Colorado River, this canal is 46 feet wide at the bottom, with 2 to 1 side slopes, and is 9.25 feet deep from ground surface to the normal water surface. At the other end of the 47-mile stretch, the bottom width is reduced to 40 feet, with 2 to 1 side slopes, and an average depth of 8.34 feet to water. Actual excavation averages 14 feet throughout. The canal is designed to accommodate 1,500 cfs of water from the Colorado River.

Scattered sagebrush and cactus in the canal right-of-way is cleared by a crew of three men. Then a Model 6150 Bucyrus-Monighan walking dragline, with a 160-foot boom and a 12-cubic yard bucket designed by C. A. Colon, Excavation Superintendent for Morrison-Knudsen, handles the rough excavation of the canal. This huge machine averages 11,000 cubic yards of material each 24-

hour day, depositing the material along each side of the canal to form a levee. Powered by a 6-cylinder Fairbanks-Morse diesel motor, the Monighan uses about 350 gallons of fuel to handle its daily output. Walking backward on its rolling cams two or three steps at a time, the dragline roughs out the shape of the canal to within 1 foot of grade.

When the Monighan finishes the rough excavation, a Bucyrus-Erie 37-B dragline handles the remainder of the sand to bring the canal to grade, with the help of a Caterpillar RD8 and Le-Tourneau bulldozer and power-control unit. The 37-B handles 1,100 cubic yards of earth per 24-hour day in finishing the excavation and dressing to final shape the side slopes and levees which, with a crest width of 24 feet, extend the entire length of the canal.

The digging machines on this project

are 100 per cent equipped with preformed wire rope to insure longer rope life, less wear on sheaves and drums, and less wear on men. The latter is an important factor on this job, where day temperatures soar to 125 degrees and men tire easily. Therefore anything which reduces the amount of work necessary and makes their work easier is a definite asset. Preformed rope on the Coachella job has cut the installation time in half and thus saved many hot disagreeable hours of labor. It is reported that this type of wire rope is giving about 65 per cent more wear than was figured by estimators when the job was bid.

Excavation for Drains

The main canal follows a gradual contour through the desert, starting with a floor grade of 92.87 feet above sea level at Sta. 4570+00. Lying east of the canal near the middle of the job are the Chocolate Mountains, a rocky range of hills devoid of vegetation. Cloudbursts which fall on the mountains in the winter rainy season drain

(Continued on page 16)



A Marion 392 excavates for a drainage ditch on the W. R. Shriver subcontract on the Coachella arm of the All-American Canal.

Concrete Is Pumped For Texas Overpass

**New Projects North of
Houston, Texas, Include
Overpass and Underpass
Built by Russ Mitchell**

(Photo on page 44)

† THREE highway projects of major importance were undertaken by the Texas Highway Department immediately north of Houston during the past year. The first is the extension of Shepherd Drive just west of the business center of the city to provide an alternate route into Houston from the north. On this project nine blocks are within city limits and about 1 mile outside the city, making the total length about 2 miles and including an underpass. The roadway consists of a 20-foot asphalt surface on a gravel base on a 70-foot right-of-way

inside the city and a single 22-foot pavement, at present, on a 100-foot right-of-way outside the city. Part of the work on Shepherd Drive was awarded to Russ Mitchell, Inc., of Houston, Texas.

Right-of-way is being secured to permit the eventual development of the project from 2 miles outside the city limits to 8 miles north of the city, with three 11-foot lanes in each direction, divided by a 30-foot esplanade in the center. Outside each 30-foot roadway will be a 20-foot esplanade with a 20-foot service road and a 12-foot planting strip back of the curb. Continuing north of the work on Shepherd Drive is 6 miles of concrete paving, 22 feet wide, awarded to Harrison Engineering & Construction Co. of Kansas City, Mo.

The third project is on U. S. 75 about 2 miles east of the Shepherd Drive project and involved the construction of



M. H. Hasler, who is building the concrete structures on the Coachella Canal, uses this Bay City Mack-mounted truck crane to place and strip the special steel forms for the siphons.

a 0.36-mile concrete overpass to eliminate a dangerous railroad crossing.

Shepherd Drive Underpass

The underpass on the Shepherd Drive project is built to carry a single track, is 22 feet wide and has six steel girders under the rails and cantilever brackets to carry the hand rails. It consists of three piers and two abutments with sidewalks back of the outer piers not less than 6 feet from the curbs. This is done deliberately in the design from a utilitarian standpoint, because it has been noted that where pedestrians are walking close to a roadway, cars tend to drive away from the curb, hence reducing the lanes available for vehicular traffic.

The underpass area is to be landscaped later by the Texas Highway Department. Excellent architectural treatment is given to the concrete piers with curved caps extending down for several feet from the top. The excavation involved in lowering the grade at this underpass amounted to 27,000 cubic yards of clay and loam which was hauled 2 miles to make the embankments on the new overpass on U. S. 75. These two projects were tied together in the bidding in order to eliminate the necessity for securing borrow pits for the one project and wasting excavation from the other in this flat coastal plain.

Design of U.S. 75 Overpass

The 0.36-mile concrete overpass on U. S. 75 just outside the city limits of Houston consists of approach embankments with a concrete pavement from 20 to 48 feet wide. The approach embankment is a good sand clay from the Shepherd Drive excavation, and was compacted with a sheepfoot roller and topped off with 15 inches of selected material immediately under the pavement.

The structure consists of thirteen 40-foot spans, one of which is a steel I-beam span over the 2-track line of the Houston Belt & Terminal Railroad. The overpass carries two 24-foot roadways and a 4-foot concrete esplanade in the center, and a 5-foot sidewalk on each side. The foundation for the piers consists of H-beam piling with steel plate caps carrying the reinforced concrete footings. A 22½-foot clearance is provided from low steel to the top of the rails. Rough timber falsework was used

(Concluded on page 21)



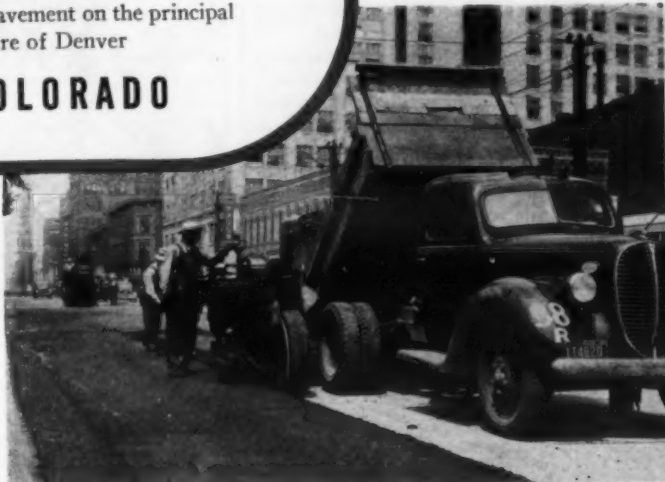
C. & E. M. Photos

Following the concrete for the U. S. 75 overpass north of Houston, Texas, from the mixer through the Pumpcrete line to the deck of the structure.

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Ocean City

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placing a new Sheet Asphalt Sur-
face on 10 miles of State Highway
No. 146

ILLINOIS**AMES AND WEBB**

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top on U. S. No. 60, near Fort
Story

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Member of Controlled Circulation Audit

Issued Monthly by Bittenheim-Dix Publishing Corp.
Editorial and Business Office: 470 Fourth Ave., New York City
Printed in Mount Morris, Ill., U. S. A.

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Chicago, Ill., Daily News Bldg., George S. Conover, Vice President; John T. Dix
San Francisco, Calif., Mills Bldg., Duncan A. Scott

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Highway Departments and Flight Strips

An important contribution to National Defense can be made by state and county highway departments in the construction of "Flight Strips" in highway rights-of-way or roadside-development areas adjacent to both main and secondary roads. These auxiliary landing areas are built 300 to 800 feet wide and 3,000 to 8,000 feet long, for military aircraft. The runway on the area is 150 feet wide and has a hard surface. The value of this so-called Hanks' Plan for the dispersion of aircraft has already been demonstrated in Europe where camouflaged Flight Strips are used effectively as temporary bases for squadrons of fighter planes not undergoing complete servicing.

On June 5, 1941, Major General George H. Brett, Chief of the Army Air Corps, recommended to the House Roads Committee that 400 auxiliary landing fields should be built adjacent to the nation's highways to facilitate "mass flights" of fighter planes to ward off any enemy attack. The Defense Highway Bill, passed by Congress, vetoed by the President, passed again by the Senate and then killed in the House, appropriated \$10,000,000 for the construction of Flight Strips. Since the objection to the Bill was not concerned with this item, it may be assumed that some provision will be made for Flight-Strip construction.

Although the construction of these 400 auxiliary landing areas or Flight Strips has not been definitely authorized, state highway departments should realize their responsibility in aiding their construction. Counties may make their contribution to National Defense by constructing such aviation aids along county highways, and even the small community, which feels that it is shut out from the benefits of aviation, can remedy that situation by building at least one Flight Strip adjacent to a highway within its own limits. In this way, a small community will have available the necessary landing facilities at minimum cost, and will be performing an inestimable service to air-minded individuals in its own community, as well as serving aviation throughout the nation by providing auxiliary landing areas for commercial and military planes.

It is interesting to note that Flight Strips were conceived as an aid to commercial flying somewhat over a decade ago by Lieut.-Col. Stedman Shumway Hanks, Army Air Corps, a serious-minded young man who has devoted his life to aviation. When the possibility of war on our own continent awakened an appreciation of the value of Flight Strips in national defense, Hanks was called to Washington where a full program of Flight-Strip construction has been studied by the Army Air Corps. This study resulted in the recommendation by Major General Brett for 400 Flight Strips, which would require from

40,000,000 to 80,000,000 square yards of surfacing.

The planning, design and selection of methods and materials to carry out the program should be left to the state highway departments, to be handled in much the same manner as Federal-Aid projects, with the final approval of the Public Roads Administration being required. This logical and efficient manner of carrying on essential defense construction seems to be in jeopardy just now, and every effort should be made to keep defense-highway and Flight-Strip construction in the hands of those best organized and qualified to carry it out efficiently and speedily.

Already many states have authorized the construction of Flight Strips by their state highway departments, but as yet no definite action has been taken. This action should be stimulated by the report of Major General Brett, and we hope to see Flight Strips grow up adjacent to our highways as a definite and important contribution to National Defense. Those states and counties which have been backward in making plans and considering sites for such operations should give immediate attention to the potential contribution they can make by starting the construction of a well-integrated chain of Flight Strips at once.

For those not familiar with the development of Flight Strips, we recommend that immediate contact be estab-

Federal-Aid Funds For Defense Roads

The use of regular Federal-Aid funds for construction of 4,262 miles of defense highway and for engineering work on an additional 1,548 miles has been approved in the past year, according to a recent announcement by the Public Roads Administration.

The regular Federal-Aid funds apportioned to the states each year are available only for use on the designated Federal-Aid system. Commissioner MacDonald stated that the state highway departments have cooperated wholeheartedly in applying these funds together with matching amounts of state funds to defense highways wherever possible.

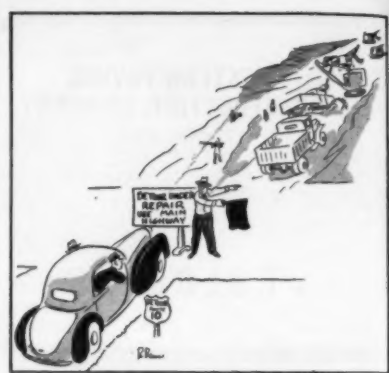
Access roads to defense areas that are also on the Federal-Aid secondary system are being improved, and portions of the Federal-Aid system on the strategic system are being given priority.

The 4,262 miles of construction to be financed by Federal-State funds and the 1,548 miles of surveys or engineering supervision of construction for work to be carried out with other than Federal and highway funds is to cost \$176,000,000 of which \$98,000,000 is Federal Aid. This mileage is classified as follows: strategic miles, 4,340 miles; access roads to army posts, 910 miles; to naval establishments, 250 miles; to industrial areas, 100 miles; reservation roads, 200 miles; Hawaii defense, 10 miles.

The program includes 396 structures, four-fifths of which are bridges and the remaining grade separations at railroads or other highways. Work on an additional 2,010 miles, including 106 structures, to cost \$80,000,000, has been programmed.

In many cases defense activities have swelled traffic volumes far beyond highway activities, and available funds are being expended at critical points to eliminate the most serious bottlenecks.

lished with the American Road Builders' Association, International Building, Washington, D. C., or with Thomas H. MacDonald, Commissioner, Public Roads Administration, Federal Works Agency, Washington, D. C. Both of these agencies have complete information which will be made available to state and counties promptly. Also a book entitled "Aviation Gets Down to Earth," copies of which may be purchased through this magazine, gives considerable information on this subject.



Frost Action Studies Under New Fellowship

Since 1938 investigations have been underway at Purdue University to determine the effects of admixture treatment on frost action in different soil mixtures, and on the migrating characteristics of chemicals used for treating the soils. This work is being conducted by the University's Engineering Experiment Station in cooperation with the State Highway Commission of Indiana. A 1940 progress report on the studies revealed that as long as the soil mixtures tested retain the calcium chloride in full concentration, 2 per cent or less chemical prevents freezing at minus 10 to minus 15 degrees F. and thereby prevents frost damage.

To carry these investigations further, the Calcium Chloride Association has recently established a fellowship at Purdue University with the object of studying (1) the minimum amount of calcium chloride necessary to prevent appreciable frost heaving in different types of soils subject to varying temperatures, (2) the degree of permanency of chemical treatment under various conditions, and (3) the relative effectiveness of different methods of applying the chemical.

Floyd O. Slate, a graduate of Purdue's School of Science, was selected as the Research Fellow and will conduct the program under the supervision of K. B. Woods, Assistant Professor of Highway Engineering.

Appeal for Employment Of Men Between 45-65

Wider employment opportunities for men between the ages of 45 and 65, especially on defense and other projects, are urged in an appeal by Senator Carl Hayden of Arizona and Federal Works Administrator John M. Carmody. Senator Hayden wrote to Administrator Carmody about this serious problem of the man of 45 and over who is ready and willing to work but who can not find employment because of the fact that he is considered too old, asking if something could be done for this group on Federal projects.

In replying, Administrator Carmody pointed out that the FWA had no jurisdiction over the employees of contractors on Federal projects, but stated that he had sent out an appeal to the Associated General Contractors of America, the American Road Builders' Association, the American Federation of Labor, the Congress of Industrial Organizations and other groups asking their cooperation in giving serious consideration to the employment of older men, in order to help solve this problem.

More Toll Bridges Freed

The toll gates have been removed from twenty-seven bridges in four states with Federal assistance in the past few years, according to an announcement by the Federal Works Agency. These bridges, fifteen in Alabama, eight in Arkansas, three in Tennessee, and one in Idaho, were made toll free under agreements worked out by the state highway departments and the P. R. A.

ANOTHER STEP IN NATIONAL DEFENSE



Strategic Network Improvement + Flight Strips = Greater Security for U. S.

Help in Speeding Up Tank Car Unloading

To aid in the maximum use of transportation facilities for oil under the National Defense Program, the Standard Oil Co. of Indiana has completed arrangements which will assure the immediate unloading of tank cars at its thousands of bulk plants and the prompt return of the cars to refineries or other shipping terminals. An appeal has been made to its customers who buy in tank-car lots to cooperate similarly.

Standard of Indiana is attaching to forms for bulk-plant agents and cus-

tomers who receive road oil, asphalt, tractor fuel, diesel fuel, motor and aviation gasolines, and other petroleum products a sticker reading: "For National Defense. Help the national program by unloading and returning this car promptly."

New Manual on Cleaning Construction Equipment

A new booklet giving concise data on modern methods of cleaning many different types of road building and construction equipment before repair and repainting, or for regular maintenance,

has recently been issued by Oakite Products, Inc., 57 Thames St., New York City. Information is given on pressure-spray and steam-gun methods for thoroughly and speedily removing oil, grease, tar, etc., from trucks, tractors, shovels and cranes, graders and other equipment. In addition, many practical tips are given on cleaning motor parts with either hot or cold solution before inspection and repair, removing sludge and carbonized oil deposits from inside surfaces of gasoline and diesel-engine crankcases, and cleaning aluminum and alloy pistons and connecting rods.

Copies of this 12-page illustrated booklet, prepared primarily for maintenance superintendents and foremen, may be obtained direct from Oakite Products, Inc., by mentioning this item.

New Macwhyte Vice Pres.

Acknowledging his years of service as General Superintendent of the Macwhyte Wire Rope Co., the Board of Directors of that company recently elected Robert B. Whyte, Vice President in charge of operations. Mr. Whyte has been associated with the wire rope industry since 1913 and with Macwhyte since 1917.

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New Steel Span Across Niagara

Rainbow Bridge, 1,450 Feet Long, Replaces Old Honeymoon Bridge Which Was Destroyed by Ice

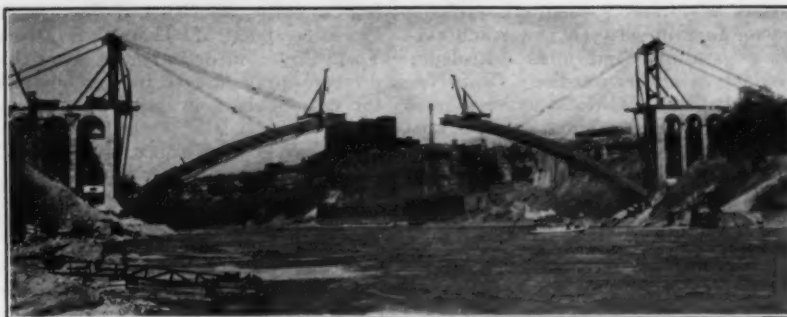
(Photo on page 44)

† THE completion of the Rainbow Bridge across the Niagara River and Gorge this autumn provides an additional gateway between the United States and Canada, on the world's most peaceful border. Replacing the Falls View Bridge, more popularly known as Honeymoon Bridge, which was destroyed by a record ice jam in 1938, the new structure was started on May 16, 1940, on a site close to that of the old bridge. At this point, about 2,000 feet downstream from the American Falls, the gorge is about 200 feet deep and 1,000 feet wide. The steel arch of the bridge has a span of 950 feet, rising from its supporting abutments on the American and Canadian sides of the river to the level of the top of the gorge, and is said to be the longest hingeless arch in the world.

Because of the depth and turbulence of the water at this point, the erection of any kind of supporting piers or substructure in the stream was impractical. The river, forced by the Falls through the narrow gorge, flows at from 25 to 30 miles an hour, has a volume of about 6,000,000,000 pounds of water a minute and is over 175 feet deep. During part of the time, the gorge is choked with ice. Each of the main arch abutment piers, on both shores, is located about 50 feet back from the water's edge and an equal distance above the surface of the water. The piers and the approach spans rest on the solid rock which forms the sides of the Niagara Gorge, so that they do not have contact with the river and are high above any possible water or ice-pack level. This places the structure beyond the reach of the forces of nature which destroyed its predecessor.

Design of Bridge

The main arch span of the hingeless ribbed type consists of two steel box-girder ribs spaced 56 feet apart. Each arch section is made up of 24 girders 12 feet high, weighing from 49 to 75 tons. About 3,500 tons of steel were used in the ribs of the arch and 2,000 additional tons in the superstructure and decking. The two ribs are braced together with steel members for rigidity and to resist



Arch sections of the Rainbow Bridge at Niagara Falls reaching toward each other from the Canadian and U. S. shores.

wind pressure. Steel spandrel columns, resting on the arch ribs, carry the steel floor girders and concrete deck of the roadway above.

Steel Erection

With the use of supporting substructure eliminated as impractical, the engineers used a novel method for setting the big arch into position. On top of

each of the Canadian and American abutments steel towers 130 feet tall were built. Sections of the arch were delivered to the head of each abutment and then lowered by an 85-ton derrick into the gorge where they were received by a 40-ton stiffleg derrick which traveled the arch, setting each section in position, a fan-like series of cables furnishing the support after the steel was set. Corre-

sponding cables from the towers extended back 200 feet where they were anchored by deadmen of concrete weighing 600 tons each and firmly embedded in the solid rock of the top level of the gorge. This procedure was followed simultaneously from each shore.

With all sections in place, a key of steel about 11 inches wide was used to join the 475-foot sections extending from each shore. This was replaced with the permanent key carefully machined to fit to 1/100 inch. With this in place, the arch became self supporting upon its abutments, and the temporary cable supports and towers were removed. The joint between the steel arch and abutment is made by a 60-ton grillage and skewback bolted to the abutment at each terminal with 32 anchor bolts set in concrete. There are four concrete approach arches on each side, with foundations in rock.

The Roadway

The deck of the bridge will be 1,450

(Concluded on page 24)

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FOR ALL CONTRACTORS' EQUIPMENT

RETURN METAL DRUMS PROMPTLY . . . thus helping to make present supply meet industry's needs and releasing metal for National Defense.



The new Austin-Western all-wheel-drive 99-M power grader.

Streamlined Grader Has All-Wheel Drive

The new all-wheel-drive and steer 99-M power grader just announced by the Austin-Western Road Machinery Co., Aurora, Ill., is designed to meet the hardest and most rigid requirements of heavy construction and all-season maintenance, including accurate finishing and grading, according to the manufacturer.

All wheels are equipped with large-diameter tires, equal in size for convenient interchangeability, and all wheels are driven and steered by power. As a result, it is stated that the 99-M can grade steep bank and ditch slopes with a longer blade, and that it can offset the frame to distribute power along the entire moldboard to move heavier loads.

Adjustments are all made by hydraulic power control from the cab, including shifting the blade on its arms, reversing the circle, steering front and rear wheels and raising and lowering the blade. When attachments are used, hydraulic power operates the scarifier, loader, roller, bulldozer, snow plow and wing.

Further information on the Austin-Western 99-M grader, which is available with either diesel or gasoline power, may be secured direct from the manufacturer.

New Generator for Welding and Cutting

A new portable acetylene generator for use in oxy-acetylene welding and cutting has recently been announced by the Linde Air Products Co., a unit of Union Carbide & Carbon Corp., 30 E. 42nd St., New York City. This new generator, known as the Oxweld MP-10, will deliver 30 cubic feet of acetylene an hour and is suitable for welding metal up to $\frac{3}{8}$ inch thick, and for cutting steel up to 5 inches thick. It is completely portable and can readily be moved about the shop or away from the shop for work in the field.

Generation of acetylene is started, set for regular operation, and stopped by rotating a single pair of operating handles at the top of the generator. Once the handles have been set, the generation of acetylene proceeds automatically. The pressure of acetylene delivered to the blowpipe is controlled by a regulator which forms an integral part of the generator, and a separate pressure gage indicates at all times the pressure within the generating chamber.

Other features of the MP-10 include two relief valves which automatically vent any excessive pressures should they develop within the generator or in the delivery hose, and an hydraulic back-pressure valve which, by providing a water seal between the hose and generator, prevents a reverse flow of gas. The carbide hopper, which holds 15 pounds of 14 ND Union carbide, is designed for easy recharging. A revolving agitator blade at the bottom of the generator facilitates the removal of residue from the generating chamber during charging. The MP-10 is strongly constructed of

welded steel parts, it weighs 100 pounds empty and 250 pounds fully charged, and measures 3 feet $2\frac{1}{2}$ inches in height.

Further information on the new MP-10 acetylene generator may be secured direct from the manufacturer.

New Catalog on Mixers

The Ransome Concrete Machinery Co., Dunellen, N. J., has recently issued a new 8-page 2-color bulletin on its Model U14-S mixers. The Model U is a 4-wheel end-discharge mixer with a capacity of 14 cubic feet of mixed concrete plus 10 per cent, powered with a 20-hp 4-cylinder gasoline engine running at 1,300 rpm, giving a wide range of power. The 22-inch diameter intake and discharge openings in the drum permit fast charging and discharging, and eliminate choking of materials.

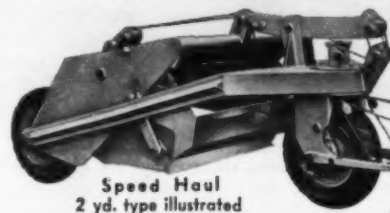
Large illustrations and complete construction data feature this catalog, No. 177, copies of which may be obtained by writing direct to the manufacturer.

New Bulletin Describes Small Wheel Trencher

Details of design and recent construction improvements on its Model 11 Utility Trencher are covered in a new bulletin, No. 4B-11, recently issued by the Buckeye Traction Ditcher Co., Findlay, Ohio. The Model 11 is the smallest of the Buckeye wheel-type trenching machines and cuts trench from $11\frac{1}{2}$ to

22 inches wide and up to $5\frac{1}{2}$ feet deep. Besides its fast road speed of nearly 5 miles per hour, the Model 11 can be loaded on a trailer in only a few minutes and hauled to new work at regular traffic speed. A specially designed Buckeye trailer is available for this purpose.

Copies of this new catalog, which is illustrated with action photographs showing its many applications, may be obtained direct from the manufacturer.



Speed Haul
2 yd. type illustrated

Also a complete line of large capacity hauling scrapers to 15 cubic yards.

**FOR Low Cost
EARTH MOVING**

The Speed Haul Scraper is a complete hauling scraper in itself. No pumps or hoists to attach to tractor. Just hitch to the Speed Haul Scraper and go to work. Four sizes: 1, $1\frac{1}{2}$, 2, and 3 cubic yard capacities.

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Equipment Since 1880

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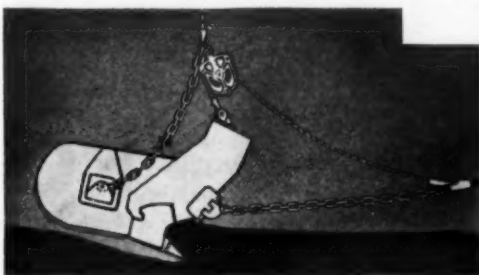
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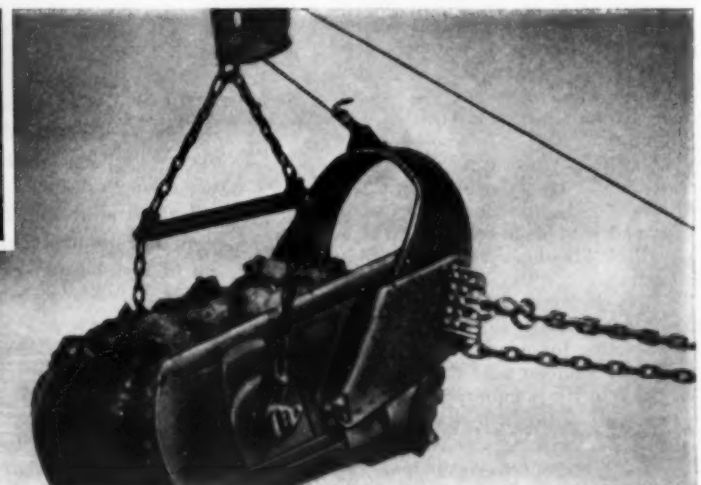
4. PAGE AUTOMATICS HANDLE EASIER . . . GET THEIR FULL LOADS QUICKER—AT ANY DEPTH! They get a head start of other, slower types. They dig and carry more "pay loads" per shift than any other make of bucket equal in size and weight!

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Automatic
DRAGLINE BUCKETS

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A Page AUTOMATIC Bucket on YOUR DRAGLINE means MORE DIRT MOVED PER SHIFT! Operators all over the country—on all kinds of jobs tell us that just by switching to Page Buckets they've increased production 20% to 50%. Get in on this "gravy"—these EXTRA PROFITS. Put a Page AUTOMATIC Bucket on YOUR job and start cashing-in NOW. Let us give you full details. See for yourself what it can do for YOU. Fill out the coupon at the left and MAIL IT TODAY!

PAGE ENGINEERING CO. CHICAGO, ILLINOIS



A Keshring Dumptor, equipped with the new Goodrich Universal Super Traction tires, working on a section of the Skyline Drive in Virginia. This unit is one of a large fleet owned by Walter & Prater, contractor of Morristown, Tenn., all of which are equipped with these new tires.

New Tires for Use On Dirt-Moving Units

For service in the construction of airports, military reservations, dams, highways and other large earth-moving projects, a new earth-mover tire capable of carrying very great loads has just been announced by the B. F. Goodrich Co., Akron, Ohio. According to the manufacturer, such giant tires with load-carrying capacities up to several tons are an important factor in speeding the construction of many earth-moving projects currently under way in the National Defense Program.

A feature of the new unit, called the Universal Super Traction tire, is a non-directional tread designed to give two-way traction, forward or backward, and a minimum of side slippage in service on the sides of hills or ditches. This tread, composed of a series of V-shaped wedges that are said to be self-cleaning and will not clog in soft or muddy going, makes the tire especially suited for use where off-the-road traction and slow even tread wear for movement over highways are required.

Matching the sturdy long-wearing tread is the heavy thickness of rubber on the sidewalls to protect the tire against chafing and cutting in operations in quarries and other services around rocks and stones.

55-Pound Rock Drill

The Hardsocg V-55 rock drill, made by the Hardsocg Drill Co., 227 So. Benton St., Ottumwa, Iowa, is operated by a new type of valve which is lighter and faster, according to the manufacturer. This drill is made of drop forgings throughout, with all parts of special analysis steel, specially heat-treated. The handle is offset slightly to provide proper balance when the drill is in operation.

The drill has a strong four-pawl rotation, it will lie on a flat board with the steel parallel to the board for snake holing, and it is made for either wet or dry drilling. In the wet drill the blow tube extends into the drill steel. The valve may be removed for inspection without loosening the side rods, and provision is made for adequate lubrication from an oil chamber near the top of the drill. This drill is equipped for $\frac{7}{8}$ x $3\frac{1}{4}$ -inch or 1 x $4\frac{1}{4}$ -inch shanks, as desired.

Further information on these Hardsocg rock drills may be secured by those interested direct from the manufacturer.

Asphalt Finishers

The Standard-Lewis asphalt finisher, which works in widths from 11 to 32 feet, with eleven forward and seven reverse speeds varying from 1.5 to 12 miles an hour, is described and illustrated in Bulletin No. 604, issued by the Standard Steel Corp., 5001 So. Boyle St., Los Angeles, Calif. Equipped with six 24-inch rubber-tired wheels with individual wheel adjustment from 1 to 12 inches, the frame of this finisher

is of 10-inch channels with 9-inch road clearance. The rakes are of the floating transverse type, synchronized with the grading blades, with a thread adjustment for the raking depth. Other fea-

tures of this finisher include its improved guiding, eliminating the flange on the wheels; its special traveling rails; and an exclusive edging attachment to speed up production.

Copies of Bulletin No. 604 and further information on the Standard-Lewis asphalt finisher may be secured by interested contractors and engineers direct from the manufacturer by referring to this item.

Burggraf Asst. Director, Highway Research Board

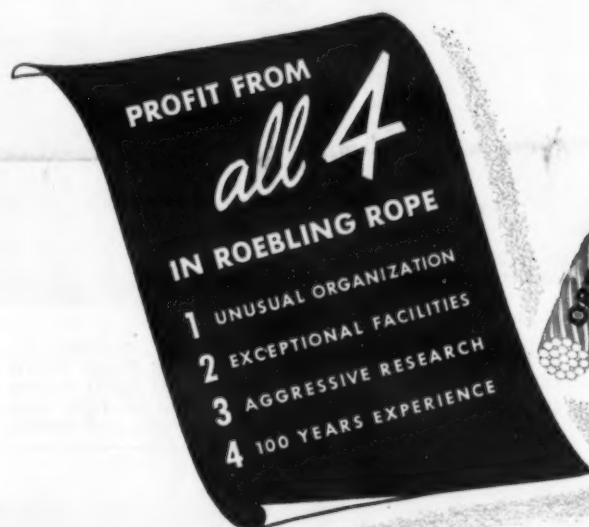
Announcement has been made by the Highway Research Board of the National Research Council, Roy W. Crum, Director, of the appointment of Fred Burggraf as Assistant Director. Mr. Burggraf has been associated with research relating to highways since 1919, having been connected with the National Bureau of Standards, the Illinois Division of Highways, the Highway Research Board, and the Calcium Chloride Association.

Welding Society Convention Scheduled for Oct. 19-24

The American Welding Society announces that plans for its Annual Meeting and Convention, to be held in conjunction with the National Metal Exposition, Philadelphia, Penna., October 19-24, are now nearing completion. Headquarters for all technical sessions, committee meetings and social events will be the Bellevue Stratford Hotel. The opening session starts Monday morning, October 20, with the presentation of medals and prizes, technical sessions continue mornings and afternoons throughout the week, and the annual banquet is planned for Thursday evening. Manufacturers of welding equipment and supplies will display industrial exhibits at the Philadelphia Commercial Museum and Convention Halls.

With welding playing an important role in defense and the increased general interest in the various welding processes, it is expected that this year's meeting will be even more successful than usual.

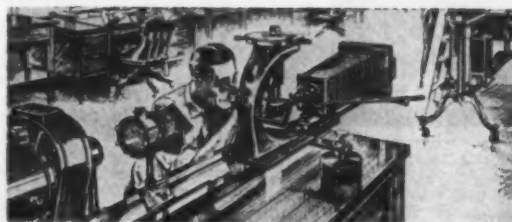
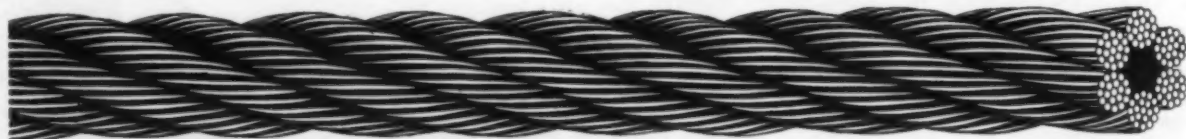
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New Aggregate Plant In Southern Indiana

Paul Frank Erected Large Crushing and Screening Plant to Furnish Stone For Bituminous Paving

(Photo on page 44)

IN early 1940, the State Highway Commission of Indiana awarded a paving contract, No. R-1983, Project No. 280B (1940), to W. L. Magaw of Richmond, Ind., for paving 12.588 miles of Indiana 29 from the Jefferson-Ripley county line north to Versailles. This is a main highway from the Ohio River Bridge at Madison, Ind., running 23 miles north to connect with U. S. 50 at Versailles. The contract included the building of a waterbound-macadam base with a 20.5-foot bituminous-coated aggregate pavement, utilizing in all approximately 83,000 tons of aggregate.

This limestone aggregate was produced locally at a roadside quarry about 6 miles south of Versailles, set up by Paul Frank of North Vernon, Ind.

Quarrying Operations

The limestone quarry was about 10 acres in extent, with 6 feet of overburden which was removed over a large part of the area by a 1-yard Koehring shovel before quarrying started. A Sullivan wagon drill using 10-foot steel and detachable bits drilled the face which was taken down in 10-foot benches. A Sullivan compressor driven by an Allis-Chalmers Model L tractor on the bank delivered compressed air to a tank from which it was supplied to the wagon drill. The contractor used 30 per cent Atlas gelatin dynamite fired by a hand battery for blasting.

The same shovel used for stripping was used to load the stone into three Indiana shuttle trucks for hauling to the crushing and screening plant at the edge of the quarry.

Crushing and Screening Plant

Driving up an earth ramp made by piling up the material stripped from the quarry area, the trucks turned and backed to a traveling grizzly feeder. This feeder let all material 3 inches and smaller drop through onto a 30-inch conveyor which was 40 feet in length. All over 3-inch material was carried over and delivered by the feeder to a 24 x 36 jaw crusher set for 5-inch material. The material from this primary jaw crusher went to a 30-inch x 40-foot conveyor and was carried to a 4 x 8-foot screen which removed all material under 3½-inch and fed the oversize into a 15 x 36 jaw crusher.

Beneath the 4 x 8-foot vibrating screen a 30-inch channel frame conveyor 22 feet long picked up the material passing through the screen, also took the material crushed by the 15 x 36 jaw crusher and the finishing crusher, a 40 x 22 roll crusher, and by a unique conveying system comprised of 110 feet of heavy-service 24-inch conveyor delivered the accumulated material onto a 4 x 12-foot 4-deck vibrating screen mounted over a 3-compartment bin. The material retained on the two top decks of this screen was divided. The oversize from the top deck was delivered back into the 15 x 36 jaw crusher and that retained on the second deck was spouted to the 40 x 22-inch roll crusher. In this manner the necessary proportions of the three sizes of stone needed were maintained.

This Pioneer plant produced 125 tons per hour, made up of three sizes of material: minus ¾-inch; ¾ to 2-inch; and 2 to 3½-inch. The use of the travel-

ing grizzly feeder made this high capacity possible as it classified material at the very beginning of operations, bypassing approximately 25 tons per hour ahead of the 24 x 36 primary jaw crusher.

The plant was driven by two 90-hp General Motors diesels with an Allis-Chalmers Model L tractor operating the roll crusher.

Hauling

The principal part of the hauling was done by seven trucks owned by W. L. Magaw. The average haul was 3.2 miles, but for the maximum distance of 6.8 miles, as many as seven hired trucks were used. Three sizes of material were hauled simultaneously while laying the first base course; fine aggregate for the

subgrade and coarse aggregate and screenings for the waterbound-macadam.

During the winter months, with the completed waterbound-macadam base being used as a temporary road, this plant furnished 900 tons of stone daily to the Madison Proving Ground, a National Defense project being constructed by the Ordnance Division of the War Department.

Personnel

The complete Pioneer crushing and screening plant described above was set up by Paul Frank of North Vernon, Indiana, and leased to W. L. Magaw, with Jesse James as Superintendent in charge of operations.

Lloyd Weed Joins Waite

Lloyd W. Weed, formerly with the Portland Cement Association in its New York office, has joined the staff of Waite Associates, Inc., New York City, sole representatives of Rosendale natural cement.

Speed Up Construction



with
"Simplified" Welding

It's easy to do your metal construction work quicker, better and more economically... exclusive operation features of Hobart "Simplified" Arc Welder let you save time, labor and money. Repair equipment right on the job with a Hobart Gas Drive Welder and eliminate costly delays waiting for new parts. It's built to operate continuously, delivering the high quality welds that mean greater profit. Write for complete details.

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That's the verdict of many dragline experts after putting the Lorain-40A through its paces. They have sent this machine into treacherous swamps—highballed it rough-shod cross country to prove its travelability. They have dug everything from the softest muck to the toughest clay with the boom at all angles, and got better than average production. Yes, they have even checked drag cable costs and found that the "40A" was saving them money.

A few of the features that make for such outstanding performance are listed briefly on this page. Complete information on these and other factors that have won this ¾-yd. machine the reputation of being the "digginest" dragline in its class is contained in the new Lorain-40A catalog. Write for your copy today.

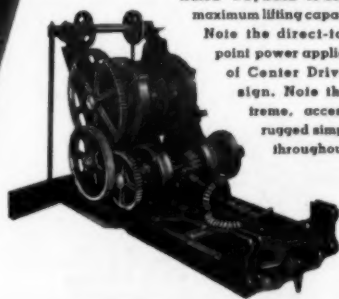
UNIVERSAL CRANE DIVISION • THE THEW SHOVEL CO.
LORAIN, OHIO



3/4 YD LORAIN 40A

BALANCED TURNABLE

Balance—Power—Simplicity—all in one turntable. Note how machinery weight is concentrated "way back" to develop maximum lifting capacities. Note the direct-to-the-point power application of Center Drive design. Note the extreme, accessible, rugged simplicity throughout.



2-SPEED CRAWLER

Center Drive design for simplicity and ruggedness of construction. 2 speeds in either direction with all steering controlled from operator's position. Extra wide swamp pads give "soft ground flotation" without sacrifice of crawler mobility.

"CABLE MISER" FAIRLEAD

This patented dragline fairlead reduces cable wear two ways—(1) the two front sheaves are free to swivel, and thus maintain a constant direct lead from bucket to sheaves; (2) the rear horizontal sheaves have geared flanges so that when one revolves the other also turns, thereby eliminating destructive cable scrubbing.



Concrete for Many Uses At R. I. Naval Air Station

(Continued from page 1)

secure this series of articles on construction features, comprising the dual concrete plants, the asphalt plant, and the paving of runways with bituminous concrete, the two latter being covered in later articles in this series.

Concrete Aggregates

Stockpiles of 18,000 tons of sand and 7,000 tons of 1-inch Navy specification gravel and 9,000 tons of 2-inch Navy specification gravel were maintained within the reservation against any possible delays in delivery of these aggregates from plants in the vicinity. The aggregates were delivered from the producing plants by contract haulers and dumped directly onto the stockpiles, which were bulkheaded with 8 x 8 timbers and 2 x 8 planks, but there was no planking on the ground surface.

Five standard mixes were produced at the plant, as follows: D-1, a 2,500-pound concrete made with 1-inch gravel and used for all structural concrete except footings; D-2, a 2,500-pound concrete made with 2-inch gravel and used for pile caps and footings; E-1, a 3,000-pound concrete made with 1-inch gravel and used for curbs and sidewalks; E-2, a 3,000-pound concrete made with 2-inch gravel and used for all paving and pile filling; a variant of E-2, also a 3,000-pound concrete made with 2-inch gravel and used for walls and the floor of the pit below water level at the general assembly and repair shop. The amount of added water and the weight of sand shown in the table below for these mixes were based on damp sand with a moisture content in the sand of 5 per cent by weight. The specified weights were for a yield of 1 cubic yard of mixed concrete with the slumps as indicated. The exception was for the E-2 variant, in which the yield was 1.06 cubic yards.

CONCRETE MIXTURES

Class	Slump	Cement (Lbs.)	Sand (Lbs.)	Gravel (Lbs.)	Added Water (Gals.)	Total Water
D-1	5"	510	1,390	1,990	29.1	35.8
D-2	4"	452	1,409	2,090	27.3	33.7
E-1	3"	594	1,330	1,970	30.0	36.6
E-2	3"	505	1,240	2,215	25.0	32.2
E-2 var.	4"	752	1,360	2,040	32.0	38.0

Classes D-1 and E-1 were usually mixed in batches to yield 4.5 cubic

yards, mixes D-2 and E-2 variant in batches to yield 4 cubic yards, and mix E-2 a regular 6-bag batch. Special mixes for specific purposes were designed in the laboratory at the Station and then a special authorization made for their use only for the specific service for which they were designed.

Batching at Plant 1

Plant No. 1 was used primarily for dry batches which went to the pavers, but it could be used to run batches for the truck mixers if needed. This plant had only a 1-cubic yard batcher, so that it had to work fast when charging the 5-yard truck mixers. To permit the change from batching to the high truck mixers down to the low batch trucks, a telescopic chute of rubber was arranged to be hoisted or lowered by a block and

tackle to eliminate the scattering of cement when the batch was dumped to the respective transporting vehicle.

The bins of this plant were kept filled by a crane with an 80-foot boom swinging a 2-yard clamshell bucket. This crane handled the 2-inch gravel which ran from 1/4-inch up to the specified size, and the sand. The weighing batcher was an 85-yard plant, and alongside it was a 400-bag cement bin but no reserve. The water and heating system for this smaller plant were the same as for Plant No. 2, which is described below.

Cement Handling

Both plants were equipped with bulk-cement-handling units consisting of 9-inch screws from hopper-bottomed steel cement cars which delivered the bulk cement to the bucket elevators. The screw and elevator in each case were driven by a 4-cylinder gasoline engine. As mentioned, Plant No. 1 had a 400-bag cement bin and no reserve bin, while Plant No. 2 had a 500-bag cement

bin and an 800-bag reserve bin which was filled by the overflow from the batch bin. Cement in the reserve bin was returned to the 9-inch feeder screw direct. A transverse 9-inch screw 40 feet long passed through the storage shed where 25,000 bags of cement were kept in stock in case of emergency. The 40-foot screw was driven by a 7 1/2-hp electric motor. All of the cement bins were equipped with an electric telltale system of paddles installed on the side of the tank to indicate the high and low level of the cement.

In both plants an extra set of anchor bolts were cast into the enlarged engine foundations to permit swinging the motor which drove the 40-foot screw so that it could be attached directly to the drive for the 9-inch feeder screw and the bucket elevator. This proved exceptional forethought, as on one occasion the clutch at the gasoline engine did break down and only a comparatively short time was lost in swinging the electric motor into position to drive

(Continued on next page)



DEFENSE SPEED-UP

puts extreme loads on machinery. For correct lubrication of **CONSTRUCTION EQUIPMENT** in heavy duty operation there are . . .

... SINCLAIR OILS and GREASES specially developed for longer service hours between overhauls. Try them for peak machine efficiency in continuous operation. To obtain lubrication counsel write nearest Sinclair office or Sinclair Refining Company, 630 Fifth Ave., New York, N. Y.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



OPERATIONS at Fouch quarry, Upper Sandusky, O. All equipment lubricated past 10 years with Sinclair products.



New C-59 Paving Breaker

With the power of a heavyweight, and handling ease of a lightweight tool.

Other advantages:

- Fully air-cushioned
- Automatic lubrication
- Low upkeep cost
- Long life
- Low air consumption
- Fewer parts
- Rugged steel retainers, opened and closed with a kick of the heel
- Valveless
- Foreign matter passes through without interference and costly delay
- No freezing in even the coldest weather

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ATLANTA

FAIR BUILDING
FT. WORTH

Organization Speeds Air Station Project

(Continued from preceding page)

the feeder and elevator.

Batching at Plant No. 2

Because of the much larger capacity of Plant No. 2, the bins were filled by a 24-inch rubber belt 154 feet long rising on a 35 per cent grade from a charging hopper to the top of the aggregate bins. The conveyor belt was driven by a 40-hp 3-phase motor. A crane with a 65-foot boom and a 1-yard clamshell bucket fed the hopper at the base of the belt, and a swinging chute at the top made it possible to deliver the material to the proper one of the three bins. The 156-cubic yard weighing batcher plant was equipped with a 4-beam scale by means of which the maximum 5-yard batches were weighed out for the truck mixers.

On the weighing platform, one man took charge of the manual weighing of the batches and dumped them into the truck mixers. A 4-inch sheet steel pipe from the top of the cement weighing batcher led the dust out through the roof, minimizing the amount of dust gathering in this section of the plant where the delicate beams were located. The batch man weighed out the 2-inch material first, then the sand, followed by the cement, and last the 1-inch gravel. Water for the batch was measured in a calibrated 400-gallon steel tank made by welding 8-gage steel on the job. The water was delivered by gallon measure, $\frac{7}{8}$ -inch height in the tank equalling 5 gallons by actual measurement. The tank was equipped with a thermometer, and during winter concreting the water was kept at a temperature of 160 degrees Fahrenheit. The lowest temperature during which concreting was carried on during the early months of 1941 was 14 degrees Fahrenheit. On the operating platform a garage-type compressor was operated to provide air for fluffing the cement in the bin.

One man in the driveway at the plant spotted the trucks and filled the water tanks of the truck mixers. The water was gaged for each truck, using 100 gallons for a $4\frac{1}{2}$ -yard mix. This gave rather a stiff concrete, but more was added on delivery at the site if it was needed for workability and if so ordered by the Navy inspector.

Labor Organization and Shifts

At times the concrete plant was operated two shifts for seven days a week, but during the last two months of operation they were able to handle the work with one shift for six days. Regular maintenance of the plant was done on Sunday.

The personnel chargeable to both plants consisted of the operating superintendent; one clerk; one dump man on the stockpile; one bulldozer operator to move the material on the stockpile so that it did not spread out over too great an area and also for the convenient operation of the crane; one man on the pump at the lake to furnish water for the plants; two diesel mechanics for the trucks; one iron worker for general maintenance; and one maintenance engineer. The personnel at Plant No. 1 consisted of one crane operator, one oiler, one batcher man, one truck spotter, two cement men, and one dispatcher. The personnel at Plant No. 2 consisted of one crane operator, one oiler, one batcher man, one truck spotter, two cement men, one dispatcher, one feeder man on the conveyor, and one top man on the conveyor. In addition, there were two firemen, one at each boiler plant described below. These men were used only in the winter

months, and all winter concreting was completed by April 15, 1941.

The Truck-Mixer Fleet

The truck-mixer fleet consisted of seventeen units, of which nine were heavy-duty trucks with 4-cylinder diesel engines, and eight with 6-cylinder diesel engines. Of this fleet, nine were 5-yard truck mixers driven by separate engines, and eight were 5-yard units with the mixer drums driven by a power take-off from the truck engine.

Auxiliary Equipment

All of the water for the operation of both batching plants was furnished from a small lake within the reservation, and was delivered by a self-priming pump powered by a 4-cylinder gasoline engine and a standby electrically-driven centrifugal pump. These pumps delivered to a point near the bottom of a 1,000-gallon tank maintained under pressure at one of the boiler houses where, during the winter, the water was

(Concluded on page 26)

WHEN TEMPERATURE DROPS TO

50°F.

WATCH YOUR CONCRETE!

Concrete mixes are designed for use at 70° F. When the temperature drops to 50 degrees or lower the development of strength is seriously retarded—concrete needs special attention.

Federal, State and other construction specifications call for the addition of Calcium Chloride to all concrete when the temperature is expected to drop to 50 degrees or lower during the 24 hours following the pouring. They have made tests and know that the addition of Calcium Chloride gives speed and assures designed strength even at lower temperatures.

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General Utility Crushing Plant

Ideal for the contractor or state or county highway department wanting a mounted crusher with a bucket elevator to deliver crushed product to bin or screen over bin. Furnished with either jaw or gyratory crusher, and with or without power unit. A low first cost, low upkeep outfit, exceptionally well built.



TELSMITH Standard PORTABLE Crushing—Screening—Loading Plants

A single crusher in closed circuit with a bucket elevator and vibrating screen. The crusher may be a jaw or gyratory (for coarse or medium sizing), or a secondary crusher for fine reduction. The jaw crusher furnished is a high-speed Teismith-Wheeling with cylindrical roller bearings. It turns out a uniform cubical product unusually free from slabs or dust. Recommended for production of 1"-1½" rock. In all cases, crusher is in closed circuit with the screen. No oversize can get into product.

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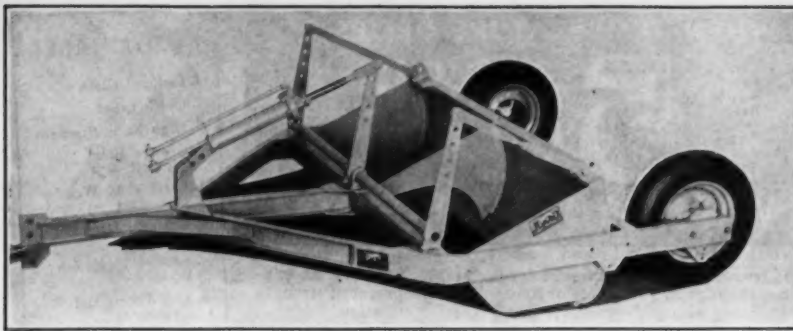
jaw or gyratory crusher, not in closed circuit. A rugged, big capacity outfit for quantity production on big road jobs.

TELSMITH Tandem Crushing Plants—A super-crushing portable for quarry use. A tandem combination—coarse crushing unit... followed by large capacity, fine crushing, screening-loading plant operating in closed circuit.

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FOR PRACTICAL IDEAS on production and profits with portables... whether you're crushing quarry rock or bank gravel... It will pay you to get FREE 20-Page GUIDE No. P-34.





The Davenport Jumbo leveler-scraper.

New General-Purpose Unit for Dirt Moving

The Jumbo leveler-scraper made by the Davenport Mfg. Co., 8660 Atlantic Blvd., South Gate, Calif., is a simple, durable, sturdy dirt-moving unit designed for land leveling and similar dirt-moving jobs. Built in sizes from 5 to 14 feet in width and capacities from 25 to 80 cubic feet, the leveler-scrapers are operated by Jumbo hydraulic power pump and valve units, taking power from the tractor through a power take-off, and which are adaptable to all standard makes of tractors.

The Jumbo leveler-scrapers can be used with wheels either at the rear or side of the bowl as they may be changed to suit. Wheels are used at the rear for leveling and at the side for making checks for irrigation. Blade adjustment is provided by threaded screw links and a series of holes in the cross shaft arms, providing a level cut and spread at all times. The wheels are either all-steel or automotive type with pneumatic tires, the latter equipped with Timken bearings.

The Jumbo power control units are made in three sizes and may be used with other hydraulically-operated tractor equipment as well as for operating the leveler-scraper.

Copies of Form No. 112 describing and illustrating the Jumbo leveler-scraper may be secured direct from the manufacturer by mentioning this item.

New Diesel Oil

After a considerable period of research followed by extensive road tests, the Galena Oil Corp., 421 Culvert St., Cincinnati, Ohio, has announced a new Pennsylvania lubricating oil for diesel engines and heavy-duty gasoline engines which is known as Super Galena Delube diesel oil, double fortified. This new oil has been developed specifically to meet the requirements of the modern diesel engine and to provide greater resistance to deterioration in the engine.

This company has been in the lubricating oil business since 1869 and one of its staff, the late Dr. P. H. Conradson, developed the Conradson carbon test which is in use all over the world as one of the factors in the analysis of lubricating oil. It is reported that this company was the first refiner to produce an oil passing the test for the Liberty motors in the last war, and in 1939 developed its Galena X-18 for automotive gear lubrication. With the development of the Super Galena Delube, this company states that it has combined for the

operator of diesel and peak-load gasoline engines the values of a high-viscosity-index Pennsylvania oil with the quality of keeping the engine clean as it operates.

A new 4-page folder, explaining the features of Super Galena Delube, may be secured by interested contractors and state and county highway departments direct from the producer by referring to this item, or from this magazine.

Cutting Attachment For Welding Torches

Among the features of the new Rego KXA cutting attachment, recently announced by the National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill., is its increased body length of 12 inches, plus an extra long high-pressure lever, for better balance and operating control; the Rego diaphragm for leak-proof high-pressure oxygen valve action; and a hard non-warping forged-alloy head to withstand the terrific heat developed in heavy cutting.

All Rego Series X welding torch handles, to which this new attachment easily couples, have large streamlined gas passages with ample capacity to carry the large volume of gas required for tough or heavy-duty cutting. An oversize high-pressure oxygen tube is designed to maintain an unrestricted flow of cutting gas, and the triangular arrangement of the special alloy tubes produces maximum strength and resistance to bending. An easy-grip valve

wheel is pressure-fitted to a non-seizing Monel stem, and the conical valve stem and seat design permits accurate pre-heat flame adjustment. The KXA uses standard Rego KX cutting tips.

Further details on the KXA cutting attachment are contained in a new circular, copies of which may be secured direct from the manufacturer by mentioning this item.

Chain Belt Promotions

A number of personnel changes has just been announced by the Chain Belt Co., Milwaukee, Wis. W. B. Marshall, formerly Assistant Sales Manager of the Conveying & Engineering Products Division, has been promoted to Sales Manager. B. E. Sivy, former San Francisco Branch Manager, has been transferred to Milwaukee as Assistant Sales Manager of the Chain Belt & Transmission Division. Replacing Sivy in San Francisco is S. Y. Warner, recently in the company's Los Angeles office.

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The job is now running ahead of schedule thanks to your suggestion about Jackbits. They have not only speeded up the work but they have lowered my drilling costs 23%

Reasons why JACKBITS reduce drilling costs

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- ✦ They result in the use of sharp bits a greater percentage of the time. Rock drill upkeep costs are thereby reduced.
- ✦ Air consumption per foot of hole drilled is less.
- ✦ The cost of drill steel transportation is practically eliminated.
- ✦ Jackbits reduce the amount of drill steel purchased annually.

The I-R Jackbit line is complete. You can sharpen your Jackbits on an I-R Grinder or Hotmill. You can heat-treat them in I-R Furnaces. You can forge the threads and shanks in I-R Sharpeners. Ask for Catalogue 2579.

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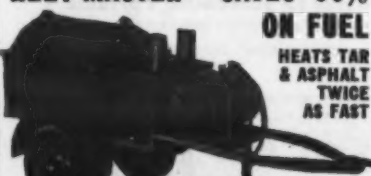
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The District Garage At Branford, Conn.

**Serves as Central Garage
For Seven Maintenance
Sections; Creosotes Guard
Rail Posts; Well-Equipped**

† TYPICAL of the better district garages in Connecticut is that of District No. 4, located on the Boston Post Road, U. S. 1, between East Haven and Branford. It is comprised of a main repair section with ells at either end for truck storage and further stalls at a lower level in the back for trucks and other storage. Each section truck has its own stall where the foreman stores the small tools used by his crew, and each has its own bulletin board for notices. There are nine maintenance sections in this District, but only seven sections store their trucks at the Branford Garage. Of the other two, Meriden is too far away so the trucks are stored locally, and the West Haven Section has many bad hills and very heavy traffic which requires immediate action during icy seasons so the trucks are kept in West Haven.

Storage Yards

There is a large paved storage yard at the back of the garage where pipe and other bulky materials are stored in small quantities. When the snow plows are through with their winter work, they are put in this storage yard and then during mid-summer they are overhauled. At the completion of the overhaul and painting, each snow plow is spotted in the front yard against the embankment as there is no room in the various truck stalls for the plows. In early November the frames are put on the trucks so that all that is required when they go out on snow-plow work is to run up to the plow and have a few quick attachments made. A temporary storage yard at the east end of the garage is used for sand, chips for cracks, and for guard-rail posts.

The Rear Truck Shed

At the rear of the main repair garage and one story below it because of the slope of the ground are additional stalls for truck storage built against the back of the garage. One stall at the west end is used for truck storage at night and in the day is used for washing cars. It is equipped with an Oakite tank and heater for cleaning parts and an overhead trolley with a chain hoist to handle truck differentials and other heavy parts which are to be placed in the hot Oakite bath for the removal of grease. This shed contains four stalls for truck storage and another which is used for storing chains, grease and truck tires, as well as a large Buffalo 2-wheel foam-type fire extinguisher.

Back of this shed in the basement of the main repair garage is a clothes room and shower for the men as well as the steam heating boiler for the entire garage. Beyond the entrance to the boiler room, which also affords access through to the center of the main repair garage, are five more stalls for truck storage.

The Main Repair Garage

Although somewhat cramped for space because of the expansion of its activities, the main repair garage is remarkably well organized to handle the large volume of work required in maintaining the fleet of trucks and other road and roadside maintenance equipment used by this District and other branches of the Department. At the east end is a complete blacksmith shop with a blower operated by a 1/4-hp motor, a rack for storing iron used in repairs, an overhead trolley with a chain hoist, a bench and the usual anvil, and a bar set across one wall for hanging spare chain. Similarly, a rack is placed at the bottom of this wall for sharpened picks. By maintaining a stock of repaired chain and sharpened picks, the blacksmith can deliver



C. & E. M. Photo

The State Highway Department Garage for District 4, as seen from U. S. 1, in Branford, Connecticut.

six or a dozen to any section foreman who requires them, receiving the dull picks or broken chain in return. These he can get into shape in spare moments and thus minimize delays in his own work and in furnishing supplies to the foremen.

In the next section of the garage is a machine shop with space for five trucks to be overhauled at the same time, al-

though only one of these spaces is equipped with a pit. The machine shop is equipped with a Manley hydraulic press of 60-ton capacity and an Oxweld acetylene welding outfit with a wall cabinet for tips, goggles and a small supply of welding rods. There is a small Monarch lathe, two small drill presses, a Toledo power hack saw, a Raybestos

(Continued on page 28)

WIRE ROPE SERVICE RECORD

Record of _____	Rope _____
Date On _____	Date Off _____
Work Accomplished _____	
Lubricated (Date) _____	
Remarks _____	
Record of _____	Rope _____
Date On _____	Date Off _____
Work Accomplished _____	
Lubricated (Date) _____	
Remarks _____	
Record of _____	Rope _____
Date On _____	Date Off _____
Work Accomplished _____	
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Remarks _____	

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TO YOURSELF THE
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ECONOMICAL and EFFICIENT

Asphalt Joint • Rubber Joint
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THE PHILIP CAREY COMPANY
Dependable Products Since 1873
LOCKLAND CINCINNATI OHIO



The new Cedar Rapids Morok all-portable super crushing plant.

New Portable Plant For Fast Quarry Work

Highways, airports, cantonments, munitions plants and the many other defense construction projects under way have created a need for the fast delivery of thousands of tons of aggregates. Making its contribution to the defense construction effort, the Iowa Mfg. Co., Cedar Rapids, Iowa, has designed a new portable super quarry crushing plant which, it is stated, will produce 150 to 200 tons of material an hour in a continuous flow from quarried rock to delivery trucks in one operation.

Known as the Morok, this plant is built in three major units, each mounted on pneumatic-tired trucks for easy transportation and speedy setting up. The primary unit with its heavy-duty rock feeder and 2540 jaw crusher handles rock direct from the quarry. A belt conveyor then takes this crushed material to the secondary plant, consisting of a 4024 roller-bearing roll crusher, a 1036 secondary jaw crusher and a 48-inch x 12-foot horizontal vibrating screen. From here the aggregate is conveyed to a bin unit where a second 48-inch x 12-foot screen does the final grading over the 40-yard compartment bin. The bin compartments are equipped with gates for discharging to trucks, and the bin unit has a raising and lowering device for erecting and dismantling, and a special steel-frame truck for transporting.

Power for the operation of the Morok plant may be all electric or a combination of diesel and electric. The all-electric plant has separate motors for all crushers, screens and conveyors, supplied by either a generator or highlines. In the combination arrangement, diesel motors operate the three crushers, and electric motors are used for the screens and conveyors. A small generator set is required to supply electricity for the motors.

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on
\$395⁰⁰
Pneumatic Tires

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Send for catalog describing generators and our complete line of portable poles for floodlighting.

E. B. KELLEY CO., Inc.
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Long Island City, N. Y.

Bulletin SRP-1, giving complete details on the Morok portable crushing plant, may be secured by those interested direct from the manufacturer.

Catalog on Safety Shoes

The Lehigh Safety Shoe Co., Inc., Allentown, Penna., has recently issued a new illustrated catalog on its line of safety shoes for workmen. Included is the Lehigh "Safety Shoe Buyers' Guide", giving complete information on what to specify in buying safety shoes, and

illustrations showing 43 types of safety shoes with special sole constructions for every industry and working condition.

Copies of this catalog, entitled "Bombproof Lehighs", may be obtained by writing direct to the manufacturer and mentioning this item.

A.R.B.A. Directors Vote To Omit 1942 Road Show

The Board of Directors of the American Road Builders' Association has reaffirmed its policy of aiding National Defense and has decided that this can best be carried out by holding its annual convention as usual in 1942.

It has, however, decided to eliminate the Road Show because of the fact that road-building equipment is so essential to National Defense that its use in the Defense Program should not be delayed for exhibition purposes, even for a few weeks.

The Convention, the time and place of which will be announced later, will be devoted entirely to the presentation and

discussion of subjects of the greatest National Defense interest.

New Snow-Plow Catalog

A new and complete catalog on Davenport-Frink V-type snow plows is now available to state, county and town highway engineers responsible for snow-removal operations. These plows are made in light and medium models for mounting on 1½ to 2-ton trucks, and in heavy-duty models for extra-heavy plowing, with or without the wing attachment. One of the features of these plows, the Davenport-Frink selective power hydraulic control which is furnished as standard equipment, includes an independent lift for the snow plow, an independent lift for the front end of the wing and another for the rear end of the wing.

Copies of this new catalog, No. 41 DB, may be secured in the East from Carl H. Frink, Clayton, Thousand Islands, N. Y., and in the West from the Davenport-Besler Corp., Davenport, Iowa.



STRONG AS A GRIZZLY...

handles like a kitten



Bethlehem Purple Strand Form-set Wire Rope combines two of the most important qualities a wire rope can have: strength and easy handling.

Bethlehem Purple Strand is made of 100 per cent Improved Plow Steel, the strongest, toughest steel used in wire rope.

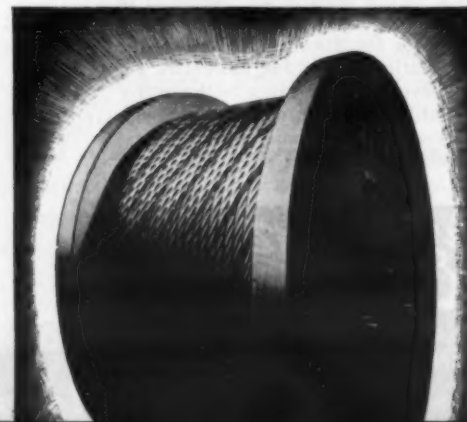
Preforming of this husky high-strength steel produces a rope that is easy to handle as well as rugged. Form-set, Bethlehem's preformed rope, is relaxed, less apt to kink or loop. Cut ends need not be seized. Broken wires won't bristle out of place. And finally, because the rope is preformed, it is better able to stand bending fatigue, thus materially increasing service.

Next time you buy wire rope for a job that requires both strength and ease of handling, get Purple Strand Form-set. It has the stamina for long service, plus the workability that speeds up operations.



BETHLEHEM STEEL COMPANY

PURPLE STRAND FORM-SET WIRE ROPE



Production and Placing Of Concrete at Friant Dam

**Features of Work Include
Pre-Cooling of Materials,
Absorptive Form Linings,
And Use of Pumicite**

By HENRY W. YOUNG

(Photos on page 44)

♦ GOOD progress is being made by the Griffith Co. & Bent Co., contractors, in pouring concrete at Friant Dam, part of the Bureau of Reclamation's Central Valley Project in California. The estimated concrete content of the structure is 2,200,000 cubic yards, making it the fourth largest concrete dam in the world, when completed, and at mid-July, 1,260,000 cubic yards had been poured. Pouring operations were begun on July 29, 1940, and have been going on with little interruption since that date. In the latter part of March, 1941, 1,250 men were employed, the peak having been 1,800. The general method by which the concrete is being handled after mixing is by steel trestle, following the general method employed at Grand Coulee.

While there are no startlingly new developments in the general plan of operations at Friant, there are a number of phases of the work which are off the beaten path. For example, the Bureau of Reclamation is making Friant the proving ground for pumicite concrete, something not previously used to any great extent in any of its dams. The Bureau has instituted other innovations, such as the use of absorptive linings for outside forms, cooling the aggregates by sprinkling, the use of an after-cooler system for the cement to cool it before mixing, cooling the mixer water, etc., to reduce concrete temperatures below a specified maximum.

Previous articles in CONTRACTORS AND ENGINEERS MONTHLY have discussed the earlier problems of excavation (C. & E. M., June, 1940, pg. 17) and the production of aggregates (C. & E. M., July, 1940, pg. 33). Handling these aggregates and their final placement in the dam in the form of concrete complete the sequence.

Concrete Aggregates

Bin storage for aggregates under the track hoppers at the end of the railroad from the gravel plant totals 5,000 cubic yards. Seven-car trains make the 3-mile round trip in 30 minutes, each train being drawn by two G-E diesel-electric locomotives with remote control, operable as a unit from either end by one man.

A sprinkler system has been installed to wet down the sand and gravel in the bins, the resultant evaporation cooling the material considerably before it is sent by a 36-inch belt to the batching plant. This is in line with the practice developed here to cool the ingredients of the concrete a few degrees here and a few there at various points so that the concrete itself will be several degrees cooler when poured, requiring that much less cooling in the dam itself.

Friant Dam is located in practically a desert region and temperatures in summer reach above 115 degrees at times. Anything exposed to the sun therefore soon becomes more or less "hot cargo".

Cement and Cooling System

Cement is stored in steel silos and is pumped by air to the batching plant by Fuller-Kinyon cement-handling equipment. The cement for bulk concrete

comes from the Calaveras, Yosemite and Goldengate plants, Monolith cements being used for grouting. The demand on these plants is so great that the cement is frequently shipped almost as soon as produced, with a lot of the heat of processing still in it. Last autumn some was actually received at a temperature of 240 degrees F. In the early spring it came in at 120 degrees and rapidly got hotter so that as the sun got in its work during the summer months abnormal temperatures were again reached.

Because of this situation, a cooling system for the cement was installed. It consists of a tank containing a series of coils through which cold water is circulated. Air from the compressor equipment is passed over the coils before introduction into the Fuller-Kinyon system. This reduces the temperature of the cement materially, about 20 degrees or from 110 degrees down to 90, in one test, when the cement was coming in comparatively cool.

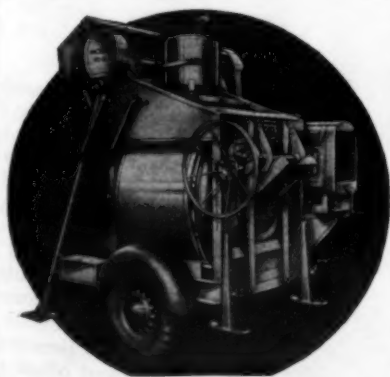
Batching and Mixing Plant

A standard C. S. Johnson batching plant is used, with four mixers, the whole set-up being similar to the plants used at Grand Coulee. The four Koehring 4-cubic yard tilting mixers are set to discharge toward the center into a collecting cone or hopper which delivers through a chute to the buckets on the tram cars below.

Above the mixers is a batching hopper which receives the weighed ingredients from the weighing batchers and is provided with a swivel chute at the bottom for charging the individual mixers.

Besides the batchers for sand, four sizes of gravel, and cement, a seventh and smaller one has been inserted for weighing out and feeding the pumicite to the batching hopper. Individual bins are located above the weighing batchers, and the control and automatic recording equipment is the standard Johnson system.

The mixing time is $2\frac{1}{4}$ minutes. The complete cycle for the four mixers,

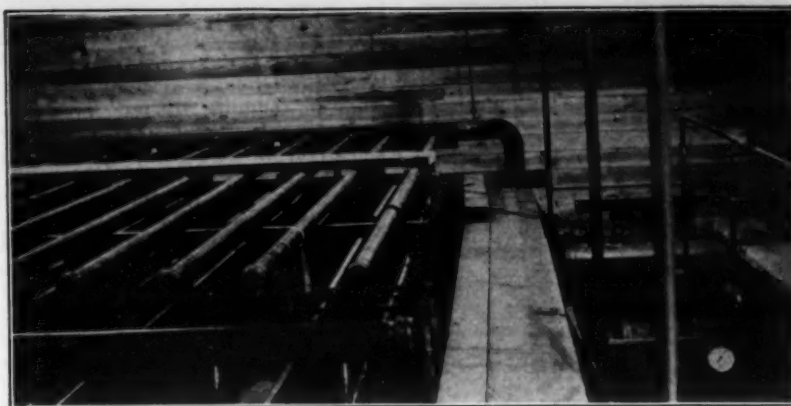


Demand These Features in Your MIXER!

- AUTOMOTIVE-TYPE TRANSMISSION, 30% to 40% more efficient, quieter, longer lived.
- HIGH CARBON MACHINED STEEL DRUM TRACKS, on chilled, ground rollers.
- 55 TO 145 ALIKE IN ALL BUT SIZE—real heavy duty service in light, fast, and discharge trailers with 2 or 4-wheel mounting interchangeable. Jaeger Cross-Cross "Re"-Mix Drum, Skip Shaker Loader, fastest "Pressure" Discharge—features that have made Jaeger the world's biggest selling line.



3 1/2 S with Measuring Batch Hopper Mixes Send today for new catalog 30% to 40% More! log and prices.
THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio



The cooling system for the concrete mixing water at Friant Dam. At the right is one of the three slush-ice machines.

totaling 16 cubic yards, is approximately $2\frac{1}{2}$ minutes, allowing about 15 seconds for charging.

The concrete for most of the dam is 8-inch mass concrete, with 8/10 barrel of cement per yard, the cement contain-

ing a 20 per cent admixture of pumicite. This is used for all parts of the dam except: 1. 8-inch mass concrete for the face of the spillway, with one barrel of cement per yard and without pumicite;

(Continued on page 32)

RAILWAY INSPECTION CARS

GARDEN TRACTORS

LIGHTING PLANTS

THESE ARE BUT A FEW OF THE WIDE RANGE OF APPLICATIONS OF BRIGGS & STRATTON MOTORS

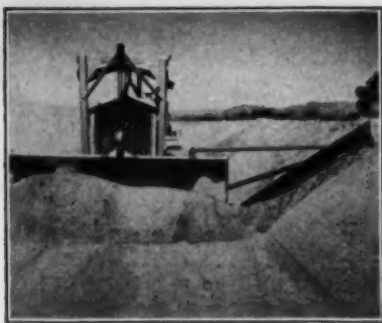
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of thousands of companies, manufacturing and distributing gasoline-powered appliances and equipment, know that Briggs & Stratton motors build and maintain "Customer Good Will."

These men approve Briggs & Stratton motors, knowing that they make good equipment better. They know, too, that Briggs & Stratton air-cooled gasoline motors assure dependable and economical performance—proved on more than a million pieces of powered equipment.

BRIGGS & STRATTON CORP. • Milwaukee, Wisconsin, U.S.A.

BRIGGS & STRATTON



A special trimmer blade on a Caterpillar D8 dressing diversion channel slope on the Shriver subcontract.

Drains and Siphons On Coachella Canal

(Continued from page 2)

down across the desert and must be routed across the siphon structures or "water bridges" in the canal to drain properly the lands lying above and below the canal. All of this water drains across the canal to the Salton Sea.

A subcontract was let to W. R. Shriver for the excavation of 1,427,000 cubic yards of material for the drains which cut through land lying above the canal and converge at the siphon structures to route the rainy season water over the canal. Shriver uses a Marion Type 392 2½-yard dragline which excavates an average of 2,000 yards of material per 8-hour shift, casting the sand to the low side of the diversion drains to form small protecting levees. This machine is also used at times to excavate for the siphon structures. The slopes of the diversion drains and levees are trimmed to neat lines by a special blade mounted on a Caterpillar D8.

Concrete Siphons

This job had scarcely begun when the worst rainstorm in 30 years fell on the desert in September, 1939. Six inches of rainfall came down in 9 hours, turning the normally dry washes leading down through the country into raging torrents. Hydraulic studies made by the Bureau of Reclamation convinced their engineers that the concrete openings in the siphon structures would have to be increased 34 per cent between headwalls to accommodate abnormal

rains. The completed revision showed a 1,470-foot increase from the original length of 4,327 feet to 5,797 feet between headwalls. Drainage water coming down from the foothills will now be able to flow over the concrete siphon structures and drain on down toward the Salton sink, lying 276 feet below sea level. One of the "water bridges" drains 77,000 acres of land above the canal.

The concrete structures involve the pouring of 17,737 cubic yards of Class A structural concrete, 14,097 yards of Class A siphon barrel concrete, 11,834 yards of concrete in floor slabs and paving, the placing of 6,876,200 pounds of steel reinforcing, 112,500 pounds of structural steel in the radial gates of the automatic spillways, and 108,600 pounds of radial gate hoists. In addition, 1,431,000 pounds of steel sheet piling has to be driven, five engine houses built, 50,000 linear feet of 6-inch cast-iron pipe drains laid, and 125,420 cubic yards of stone riprap quarried and placed along the canal.

Because wood forms wear out quickly

and warp in the desert, M. H. Hasler, the contracting partner who is building the concrete structures, uses two sets of special steel forms for the concrete siphon structures. These forms are used over and over again and are expected to last till the completion of the job. They are placed and stripped by a Bay City Mack-mounted truck crane.

Water for mixing and curing the concrete is a problem on a desert job like this. The contractor purchased 87,000 linear feet of 4-inch pipe line and connected the sections with a special coupling which takes very little time to hook up. This line runs from the East-side main of the Imperial Irrigation District where three Worthington piston pumps deliver 100 gallons of water a minute into storage tanks. Booster stations are then used along the line.

Monoliths are poured by three Rex 1-yard pavers, used alternately, and averaging about 30 yards an hour. A Northwest crane is used to hoist the concrete, as needed. An average of 125 yards of concrete is poured per 8-hour

day, and while this is a small amount, it is handled in an orderly efficient manner. Concrete is not poured in the desert between June 1 and October 1 because of the intense heat.

Riprap

At erosion points along the levees of the drainage system and particularly around the entrance to the siphon structures, the sides of the diversion levees are reinforced from scour with a 2-foot layer of dumped riprap. This stone is quarried from the Chocolate Mountains and hauled over the job road under a subcontract by J. B. Stringfellow of Los Angeles. At the present time his trucks are hauling stone 19 miles from the quarry to the job.

Two shifts are worked in the quarry, using a Bucyrus-Erie 20-B shovel to load the trucks. A Bucyrus-Erie 37-B is used as a crane with a skip box for placing the riprap along the levee slopes. Because the supply of good stone is somewhat scarce around the

(Concluded on next page)

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Walter Snow Fighter with Rotary Plow, one of 21 in use by Canadian Royal Air Force.



Walter Snow Fighter equipped with V-Plow, Leveling Wings and Center Scraper

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RUBBER

WALTER

4-POINT POSITIVE DRIVE SNOW FIGHTERS



J. B. Stringfellow, who has the sub-contract for furnishing the rock for riprap, watches his Bucyrus-Erie 20-B handle a big one.

New California Canal Will Irrigate Desert

(Continued from preceding page)

Coachella job, Mr. Stringfellow contemplates using a portable grizzly to pick up solid boulders from the washes along the canal.

Fuel

Fueling heavy equipment in the desert is not a simple task. The contractor's superintendent stripped a Ford truck down to the chassis, put on oversized tires, and hauls fuel out to the draglines over terrain almost sandy enough to stick a tractor. Colon's "sand flea," as he calls this piece of equipment, has become famous in that section of the country.

Personnel

This contract for 47 miles of the Coachella Canal and appurtenant structures was awarded to Morrison & Knudsen, Inc., and M. H. Hasler, jointly, by the Bureau of Reclamation. The entire project, handled through the Los Angeles office of Morrison-Knudsen, is supervised for the contractor by Charles Bradley, a young efficient engineer whose job of organizing and coordinating the activities of the personnel on this project is not an easy one. C. A. Colon, who has had many years' experience in the construction business, is Excavation Superintendent. M. H. Hasler, one of the contractors, is in charge of all the structural work, with B. F. Partain as his Superintendent. Charles Hill is subcontractor for the steel reinforcing, J. B. Stringfellow is subcontractor for furnishing the rock for riprap, and J. R. Lawrence is Resident Engineer for the Bureau of Reclamation.

Want information? Write the Editor.



This full capacity, industrial 1/2" Drill is handier, more powerful and an all-around better drill than many costing a third more. Specially wound high torque forced-air-cooled motor. Improved "natural grip" end and breastplate handle applies thrust directly behind drill point—and all quality features: oilless bearings, streamlined die cast case, etc., etc.

SPEEDWAY MFG. CO., 1848 S. 52nd Ave., Cicero, Ill.

Pocket Rule for Welders

The new General Electric Arc Welderule will prove a great time saver to engineers, supervisors, purchasing agents and operators of arc welders in estimating arc-welding electrode requirements. Operating in a manner similar to a slide rule, the Arc Welderule indicates directly the length of arc welded joints obtainable per 100 pounds of electrode and also the pounds of weld metal deposited per 100 pounds of electrode. The information covers eleven different commonly used sizes and types of joints, and twenty-two different sizes and types of popular electrodes in both 14 and 18-inch lengths.

An additional feature of the Arc Welderule is a selector chart which shows the various filler metal classifications as specified by the American Welding Society and the types of electrodes which meet these classifications. Although data of this nature has been published before in chart or bulletin form, the vest-pocket size of the Arc

Welderule makes it handier, easier and more convenient to use in getting the answers quickly.

This new Arc Welderule may be obtained free, without any obligation, direct from the General Electric Co., Schenectady, N. Y., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Low Hopper Handles Truck-Mixed Concrete

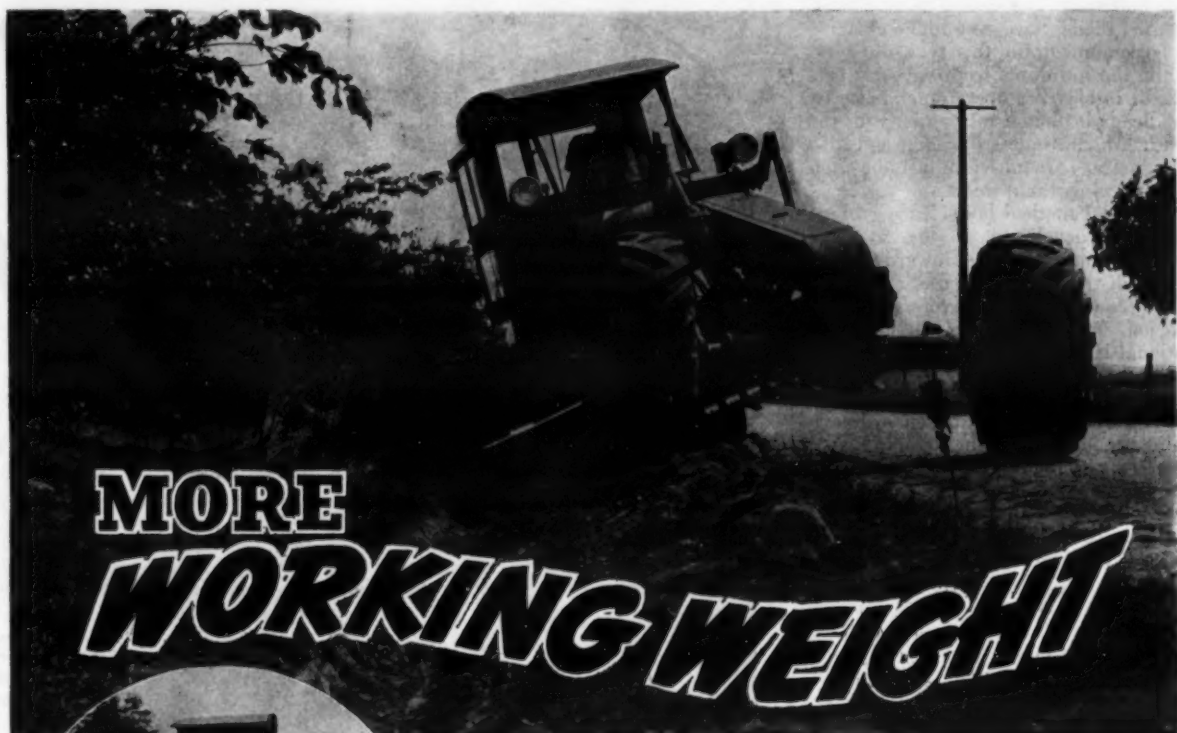
A recent addition to the Gar-Bro line of concrete-handling equipment is a low-head-room hopper to receive the concrete from high-dump truck mixers for delivery to the placing chutes or concrete buggies. With a double gate and mounted on four pneumatic rubber-tired wheels, this hopper is easily moved about the job, without jacking or the use of blocks. It is designed to accommodate the mix from a 4-cubic yard high-dump truck mixer, and has an easily removed side section in order to handle a 3-cubic yard load.



The Gar-Bro low-head-room hopper.

The all-welded steel bin is built bathtub shape to insure self-cleaning. The double clamshell gates have a floor clearance of 34 inches for loading concrete carts, and are 10 x 15 inches unless otherwise specified. Center discharge is designed to eliminate segregation. The overall dimensions of this hopper are 8 feet wide x 13 feet long x 6 feet 3 inches high.

Further information on this new concrete hopper may be secured by those interested direct from Garlinghouse Bros., 2416 E. 16th St., Los Angeles, Calif., by mentioning this magazine.



MORE WORKING WEIGHT

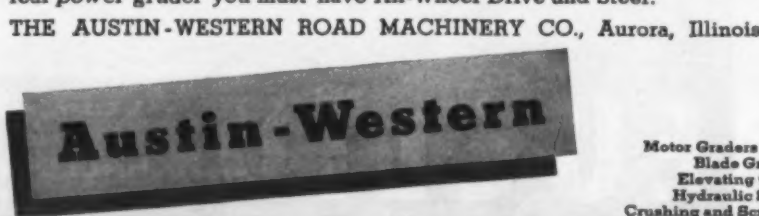
Makes the "99-M" Power Grader A Standout On Construction or Maintenance

● The time and money saving value of the "99-M's" greater working weight makes itself felt quickly on any job. Because the blade is between traction wheels instead of in front of them, a "99-M" holds its line of travel against the side-thrust of the heaviest windrow. This makes it possible to use the entire blade to move larger windrows faster and farther, with all wheels missing the windrow. And while the extra working weight of the "99-M" handles your construction or maintenance jobs in record time, it is making substantial savings in power cost . . . savings made possible by the live pulling power on front wheels, which eliminates the drag on engine power caused by 3 to 4 tons of front end dead weight.

This extra working weight resulting from All-Wheel Drive—which, from the performance standpoint, makes the "99-M" the HEAVIEST motor grader on the market . . . pays extra dividends on all kinds of work. It accounts for the "99-M's" ability to (1) work in rough ground where other motor graders cannot work at all, (2) work in sand and other soft materials where other motor graders cannot even go through with the blade empty.

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A motor grader without power on the front wheels is like a draft horse with roller skates on his front feet.

Motor Graders • Loaders
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Bituminous Distributors
Shovels and Cranes



Clearing on a 50-acre tract in Washington, with a special land-clearing blade mounted on a TD-14 tractor.

Special Tooth Blade Speeds Land Clearing

The job of clearing land covered with trees, brush and stumps is usually a slow and costly business. In the state of Washington, where there are thousands of acres of cut-over land, crawler tractors with bulldozers and special toothed land-clearing blades have been found effective and economical for this type of work. While the bulldozer has been very successful in clearing operations, it has its handicaps in that it mixes dirt with the brush, which hinders burning, and also more power is required to push the combination of dirt and wood.

A special toothed land-clearing blade has been developed in the Spokane branch shop of the Howard-Cooper Corp., distributor of International Harvester equipment in Washington and Oregon, in cooperation with the International Harvester Spokane branch. The teeth of this blade are of 2-inch armor plate, spaced 11½ inches apart, and the blade may be mounted on an ordinary bulldozer in place of the regular blade. The teeth are tough and will stand a lot of punishment, it is reported.

Frank H. Cole of Colville, Wash., equipped two of his International diesel tractors with these special blades last season to clear a 50-acre tract of land of weed or trash trees up to 1 foot in diameter, at a cost of \$15 an acre. Another land-clearing job was necessitated by the relocation of the highway and railroad around the lake created by Coulee Dam. Porter Carter of Colville, who had the contract to clear 13.5 miles of right-of-way averaging from 90 to 160 feet and totalling about 285 acres, equipped his

TD-9 TracTracTor with one of these blades and cleared out stumps, trees and roots at an average cost of \$35 an acre.

Pan American Highway Congress This Month

The greater interest in highways and highway construction on the part of our neighbors south of the border will give more than usual significance to the Fourth Pan American Highway Congress being held in Mexico City September 15-24. An interesting program of sessions and other activities has been planned, and a road machinery exhibit is being held in conjunction with the Congress. In addition to the official delegation from the United States, many others connected with the highway industry are attending.

Among the American manufacturers who are exhibiting their equipment are the J. D. Adams Co.; Aeroil Burner Co.; Brooks Equipment & Mfg. Co.; Cleaver-Brooks Co.; E. D. Etnyre & Co.; Euclid Road Machinery Co.; Galion Iron

Works & Mfg. Co.; General Motors Corp.; R. G. LeTourneau, Inc.; Mall Tool Co.; Osgood Co.; Pioneer Engineering Works, Inc.; Schramm, Inc.; Sullivan Machinery Co.; Universal Crusher Co.; and Wooldridge Mfg. Co. Caterpillar Tractor Co., which is putting on a large exhibit of its equipment, is being joined by manufacturers of tractor and allied equipment, including Athey Truss Wheel Co.; LaPlant-Choate Mfg. Co.; and Trackson Co.

The Mexican representatives of the following firms will either display their equipment or be on hand at the Exhibit: Armco International Corp.; Austin-Western Road Machinery Co.; Blaw-Knox Co.; Chain Belt Co.; Chrysler Corp.; Cleveland Tractor Co.; Construction Machinery Co.; Gardner-Denver Co.; Goodyear Tire & Rubber Co.; Harnischfeger Corp.; Heil Co.; International Harvester Co.; Jaeger Machine Co.; Lima Locomotive Works, Shovel & Crane Div.; Mack International Motor Truck Corp.; Marmon-Herrington Co., Inc.; Northwest Engineering Co.; T. L.

Smith Co.; Sterling Machinery Corp.; and White Motor Co.

In addition, the American Road Builders' Association will have a booth at the Exhibition where there will be available books on various types of highway engineering, state highway specifications and other booklets of this nature, as well as catalogs on road-building equipment and material.

Electric-Drill Bulletin

"The Fast Modern Way to Drill" is the title of a new bulletin on the latest U14 type ¼-inch-capacity small light one-hand electric drills made by the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill. Containing six pages of information and specifications on Thor ¼-inch portable electric drills for all types of applications, this circular presents the complete range of models, motor sizes, speeds and styles.

Copies of Circular No. JE-112 may be secured by those interested direct from the manufacturer.

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20 Euclids for Gifford-Hill & Co., Inc.

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The plows with the original "Sno Flo" mouldboards.

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Dualizing Old Road In Southern Jersey

F. A. Canuso & Son Builds Two Sections Extending Dual Highway Closer to New Jersey Shore Resorts

WIDENING an existing highway in New Jersey means that the demands of traffic require dualizing the road with a center safety island to separate opposing traffic. It also invariably means that the work is done under traffic. This was the case on a 5.996-mile contract awarded to F. A. Canuso & Son, Inc. of Philadelphia, Pa., on State Route S41 between Kresson and Berlin in Camden County. The new dual highway crosses the old roadway four times from one side to the other in order to straighten it, requiring forethought in the sequence of pouring slabs to minimize paver moves and to prevent blocking traffic.

The work on the single bridge started January 21, 1941, and grading was started on February 13. The contract allows 140 working days for the completion of the work from the legal seasonal starting date of April 15. About 75,000 cubic yards of the 137,760 cubic yards of estimated unclassified roadway excavation was handled with Carryalls, while the balance was moved with two 1½-yard Lima shovels and some 3,500 yards of wet excavation with a Northwest crane.

Sub-Base to Fine Grade

A fleet of twelve dump trucks was used, with an average haul of about 1 mile, to bring in the 33,291 cubic yards of gravel sub-base material. This was spread with a Caterpillar Sixty equipped with a LaPlant-Choate bulldozer and also an Allis-Chalmers Model L tractor with a Baker bulldozer, and compacted with a Buffalo-Springfield 10-ton 3-wheel roller. Finishing the top was done with an Allis-Chalmers Speed Patrol and a Caterpillar Ten power grader. The Speed Patrol was also used to push dirt over against the forms for increased stability and also to protect them from any spillage of concrete over the tops. This greatly minimizes the time and labor required for cleaning forms after they are stripped.

Batching

The aggregate and bulk-cement batching plants were located a few hundred yards off the right-of-way on a spur track at the Berlin railroad station at approximately the center of the job. Adequate stockpiles of two sizes of gravel and sand were maintained at the aggregate batching plant. Two Northwest cranes with 1-yard Blaw-Knox clamshell buckets ran on an elevation between the spur track and roadway, alternately unloading aggregates to the stockpiles and to the 3-compartment bin of the Heltzel batching plant which was equipped with Kron dial scales.

A fleet of eleven 2-batch trucks was used to keep up with the pace of the Koehring 34-E dual-drum paver. As the trucks arrived at the aggregate batching plant a service man climbed aboard, latched the partition between the two batches, turned the cement containers upright and latched them, putting the covers on, and then the truck backed under the aggregate batcher. As soon as it had received its weighed batch of aggregates, the service man opened the top of the cement containers on the truck, which drove about 200 yards down the track to the Johnson bulk-cement batching plant where it went through a depressed roadway.

The bulk-cement plant was operated by a LeRoi gas engine to drive the feeder screw from the bulk-cement cars



C. & E. M. Photo


Pouring concrete paving slab adjacent to an expansion joint on N. J. Route S41.

and the bucket elevator. A Brunner garage compressor, alongside, maintained sufficient air in a tank for fluffing the cement which might arch or pack in the hopper. The service man at the

bulk-cement plant tripped the batches of cement which were weighed by the batcher man above, and then closed the lids over the tops of the containers.

(Continued on page 36)

Saving TIME ^{by the} TON



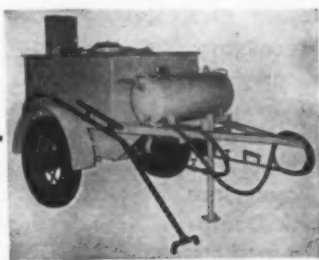
MORE APPRECIATED now than ever before, Barber-Greene Conveyors have a unique reputation for saving time as well as money. Most important at the moment is Barber-Greene's competent engineering service, which gives you the most economical layout for your own material handling requirements. B-G Standardized Sectional Construction makes for speed in planning the system, speed in erection, and assures performance as planned.

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The production records of your job are dependent on the efficiency of your material handling system. Let us work with you.

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Many sizes. Write for catalog.

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Successful Planting On Kentucky Roadsides

**Well-Planned Planting
Reduces Maintenance;
Attractive Roadsides on
U. S. 25 and 42**

By M. D. ROSS, District Engineer,
Kentucky Department of Highways

✦ KENTUCKY'S most outstanding roadside-development project is on U. S. 25 and 42 between Covington and Carrollton. Before describing this project, a little of the history of this highway might be interesting. Only about 10 or 12 years ago, to reach the town of Carrollton, it was necessary to go by railroad or spend a half to a full day traveling over the roughest kind of country road which often was impassable in places.

Credit for the reconstruction of this highway and also for its roadside development goes to the untiring efforts of Commissioner J. Lyter Donaldson. The present concrete road, known as U. S. 25 and 42 from Covington to the Jefferson County line, is approximately 85 miles. Back in 1915, long before a through highway was thought of, a strip of concrete 2 miles in length was built just outside of Covington. This was the first concrete highway in Kentucky, was 18 feet in width, laid practically to the old line and grade of the road, and cost \$13,500 a mile. In the past 10 years this narrow pavement has been replaced by a 40-foot concrete highway, at costs ranging to more than \$50,000.

Before the roadside-development projects were started along U. S. 25 and 42, Commissioner Donaldson made several trips throughout the United States, saw various types of roadside-development projects and, after witnessing the benefits derived from such projects elsewhere, became convinced of the value of roadside development. This was the beginning of Kentucky's program.

We started by advertising for and buying a number of plants and with the help of a local nurseryman and the services of one of his best superintendents, we organized a crew and did our own planting. We were very fortunate in securing the help and cooperation of

the nursery, which also assisted in planning the projects. These projects are located along U. S. 25 and 42 in places where poor drainage had been caused by the roadway sliding from its original construction, and all of our projects were planned to be beneficial as well as attractive.

Planting Projects

The first project was a slipping bank in front of a school on U. S. 25 just outside of Covington. Here Scotch pines and red cedars of the tall variety were set out, with Mugho pines of the dwarf type and several different kinds of blooming shrubs mingled with the evergreens. The next project selected was an unsightly bank and a high water tank constructed by the County on U. S. 25.



C. & E. M. Photo

Roadside planting on the "Model Mile" on U. S. 42 east of Carrollton, Ky.

This project contains approximately 40 evergreens and 150 blooming shrubs.

Projects 3, 4, 5 and 6 were small plots between Florence and Union and consist of approximately 400 blooming shrubs and 35 evergreens while Project 6, at Union, is a series of pines planted around a sharp curve which stand out

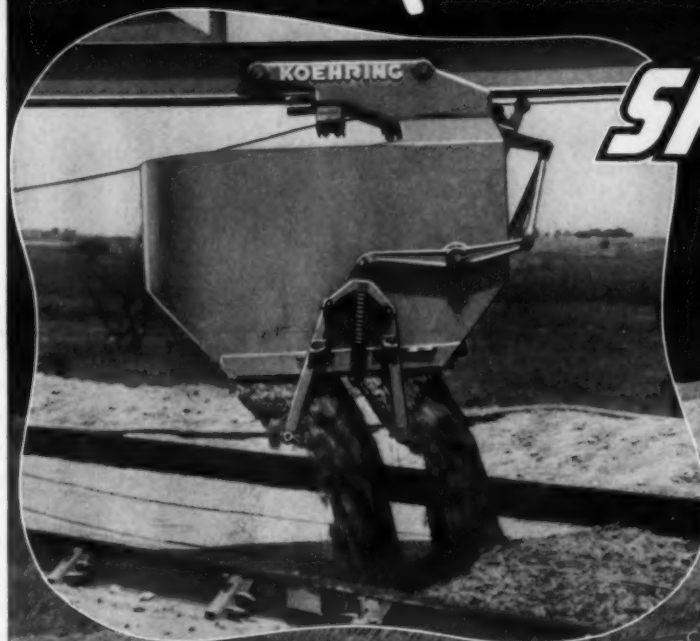
and serve as a warning to the traveling public by outlining the curve ahead.

The Model Mile

Our first important project on U. S. 42 is located near Beaver, and is called our "Model Mile". Plants and shrubs

(Concluded on page 39)

Double-Quick DUMPING and SPREADING



Koehring 34-E Unibatch Paver can swing boom to 90 degree angle when conditions require right angle pouring. Bucket can travel to end of boom for maximum spreading area.

TWIN RIBBONS OF CONCRETE

Twin doors, both opening same direction on Koehring boom buckets provide Double-Quick Dumping and Spreading. Twin ribbons of concrete are spread on the grade. Action is instantaneous... large Twin-door opening is approximately 13 square feet. Full width of bottom is used for door opening. No choking at bucket door, even with dry or harsh concrete.

Bucket shaking is not necessary. Bucket is big enough to carry full overload batch in one trip. Seconds saved when dumping and spreading cut batch cycle time. Koehring Twin-batch and Unibatch 34-E Pavers are equipped with Double-Quick Dumping and Spreading Twindoor buckets.

KOEHRING COMPANY
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HEAVY-DUTY CONSTRUCTION EQUIPMENT

MARVEL

CONCRETE VIBRATORS



Gas or Electric

Helper wheel is standard equipment on all models. Write for literature and prices.

Marvel Equipment Manufacturers, Inc.
234 So. Michigan Ave. Chicago, Ill.

Placing the Concrete In Texas Overpass

(Continued from page 2)

throughout with excellent results and practically no settlement of the forms after the construction camber had been taken out by the pouring of the concrete. In order to protect the excavation for the footings on either side of the railroad tracks, Bethlehem steel sheet piling was driven 24 feet into the ground across the entire width of excavation. After the footings were poured the sheet piling was removed.

On the deck of the structure the curbs are 14 inches high at the center and 12 inches at the sidewalks. They have a 2-inch radius at the top of the curb and 3-inch radius at the bottom connecting to the slab. The esplanade is 4 feet wide with a 3-foot strip of Raven Black magnetic iron oxide furnished by George S. Mepharm Co. of East St. Louis, Ill., worked into the surface to give a very definite contrast to the pavement, and at the ends of the esplanade the curb is carried to a well-rounded nose by hand finishing.

Concreting

Since there was a temporary shortage of cranes with long booms to handle materials going into the deck of the overpass, such as sections of wood forms, reinforcing steel, and various tools and equipment, the superintendent rigged a wooden derrick with a 10-foot boom so that it could swing the materials and equipment from outside the structure around 150 degrees onto the deck. The derrick was operated with a Sasgen hand hoist and easily handled 2,500-pound loads. Since this would have been altogether too slow a method of handling the concrete for the structure, the contractor elected to use a No. 132 Pumcrete for delivering the concrete a maximum distance of about 300 feet in either direction from its central position alongside the structure. All of the aggregate was hand-batched to wheelbarrows with three men wheeling gravel and two men wheeling sand to the two Fairbanks wheelbarrow scales. One man checked all of the weighing and then the laborers pushed the wheelbarrows forward to one of the two Rex 10-S 2-bag mixers set up at ground level. The batches were mixed 1½ minutes and then dumped directly into the hopper of the Pumcrete machine set in an old drainage ditch. The concrete was delivered through a 6-inch line, with one man in direct charge of handling the pipe line, and the six men in the concrete-placing gang shifted pipe, broke joints and moved the wooden horses as required to facilitate the delivery of the concrete at the discharge end. Two other men in the concrete gang spent all of their time finishing.

One of the unique features was the use of a specially rolled ¾-inch steel plate to form the face of the concrete curbs. The curves at the top and bottom of the curbs were difficult to incorporate in a wooden form, so the superintendent devised the rolled steel plate. This was held firmly in place by blocks cut to fit the plate and placed vertically at 2-foot intervals with a 2 x 4 along the top and bottom as a wale. This assembly was held firmly at the top during pouring by cleats nailed to the back form and was tied at the bottom every 4 feet with Universal form clamps with ⅝-inch removable rods and a ½-inch rod which remained in the curb. For the vertical adjustment a 1-inch screw with a U-shaped strap with a hole at one end so that it could slip up and down over the threads and welded to a bolt at the bottom was securely wedged to the lower wale. By means of this screw the form was ac-

curately placed at grade. There are no inlets in the curb. Instead small gratings were placed on 20-foot centers in the deck to remove water from the roadways.

In order to expedite the hand finishing of the curbs, the superintendent had special hand floats made to fit the curvature of the curb at the top and others for the bottom, which resulted in a remarkably smooth face with uniform curvatures, top and bottom.

The old problem of the uneven bridge slab has been licked by this contractor through the development of an adjustable steel screed made up in 10-foot sections and with 11-foot end sections. It consists of 1½ x 2-inch angles, double at the top and ends of each section, and an 8-inch channel with a 2-inch flange on the bottom. The diagonals are 1¼-inch pipe and each section is adjusted as to crown and sag by 12-inch rods with turnbuckles. Four bolts in the vertical end angles are used to connect two sections and a 12-bolt plate at the bottom gives a firm connection between

the channel sections. As used on this structure the screed was 52 feet overall and had had one 10-foot section removed. This method of construction of a screed makes it easily moved from one job to the other without damage and requires a minimum of time for assembly when needed to finish a deck section.

Personnel

Russ Mitchell, Inc., of Houston, Texas, was contractor for both the overpass and underpass project described above, with H. D. Austin as Superintendent. For the Texas State Highway Department, the work was in charge of D. G. McKim as Resident Engineer, under the direction of W. J. Van London, District Engineer.

Folder on Differential For Contractors' Trucks

According to the Thornton Tandem Co., 8701 Grinnell Ave., Detroit, Mich., the Thornton automatic-locking differential assures positive traction when the

going is tough, as in mud, sand, ice or snow, thus saving gas, oil and tires. A new illustrated folder recently issued by this company presents in a clear and concise manner just exactly what this differential will do, its function, construction and operation, and includes a number of letters from satisfied users.

Copies of this folder may be obtained by writing direct to the manufacturer and mentioning this item.



Complete Line of DERRICKS and WINCHES

SASGEN DERRICK CO.
3101 W. Grand Ave. Chicago, Ill.

Tomorrow- **PMCO** *WELDED DIPPERS*

will be used on even more shovels

Some of today's users:

**Koehring—Link Belt—Lima—
Thew Lorain—Harnischfeger—
Manitowoc—Butler Brothers—
The M. A. Hanna Co.—Ayreshire
Patoka Collieries—Oliver Iron
Mining Company—Pickands,
Mather & Company—Osgood**

2-yd. PMCO welded dipper

—because its welded construction permits reduction in weight, resulting in increased capacity in relation to power, the PMCO dipper is fast becoming the universal choice of shovel men for service in every field.

An increase of over 500% this year in PMCO dipper sales is proof of its rapid acceptance. Many shovel engineers have found that the PMCO dipper makes a good shovel better—in performance, speed and economy of operation.

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Established 1880

4710 West Division Street, Chicago, Illinois

Who Said

"Beautiful Snow"?

Highway Maintenance Men Have
Another Word for It—
But They Lick It!

NORTH DAKOTA.

Snow drifts come deep and often in the Dakotas. Here is a V plow on a four-wheel-drive truck removing them.

MICHIGAN

like most states also has the problem of ice control. Here is one of its sanding units at work.

MONTANA.

Widening U. S. 191 through Yellowstone Park in Montana with a V plow and wings on a Caterpillar Sixty tractor.

CALIFORNIA.

Even sunny California has its snow-removal problems. A Sno-go at work on U. S. 40, the famous Donner Summit Route.

OREGON.

A Sno-go cutting through a big drift on the Wapinitia Highway.

ILLINOIS
signs and
units work

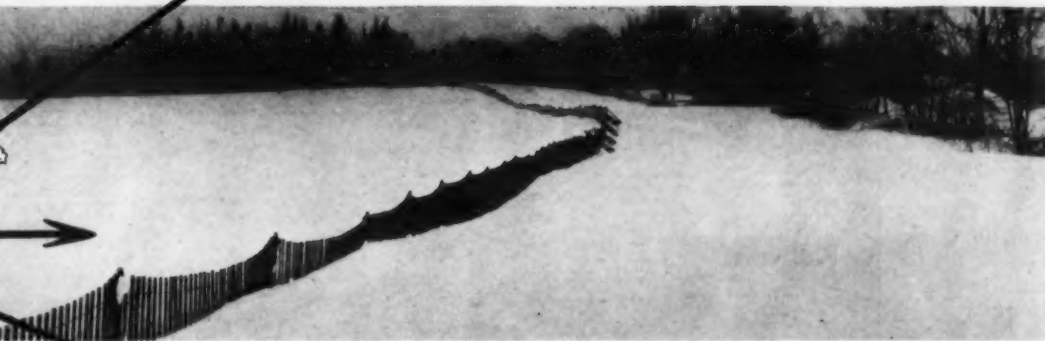
OHIO has standardized on this type of bin for storing cinders for ice control.



NEW YORK state highways are cleared of snow by the county highway departments which are paid by the State for this work. Here is a Walter truck and a V plow breaking through drifts in Niagara County.



CONNECTICUT uses about 155,000 feet of snow fence to trap snow off the highways. Here is an installation in the town of Litchfield.



MARYLAND. Snow-clearing operations on a Maryland highway.



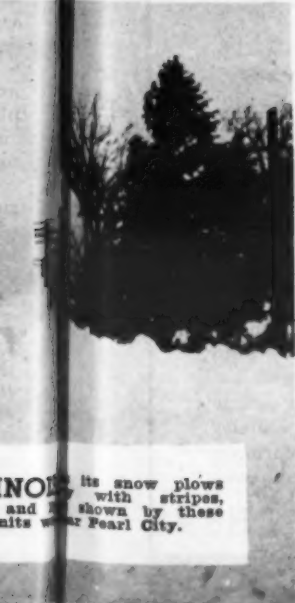
NEW JERSEY. A cavalcade of Mack trucks with reversible moldboard blades working on Route 4 in Monmouth County, N. J.

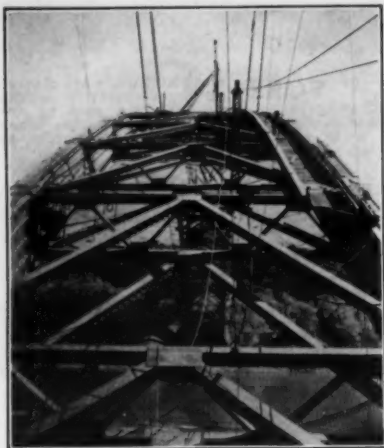


PENNSYLVANIA. Snow removal goes on night and day if necessary. This striking night view of a rotary in action was taken on Route 422 in Lebanon County.



NOB its snow plows with stripes, and shown by these units near Pearl City.





Safety nets protected workmen on the Rainbow Bridge at Niagara Falls, spanning the world's fastest natural flowing water.

New Rainbow Bridge Spans Niagara Gorge

(Continued from page 6)

feet long, with two 22-foot roadways separated by a 4-foot central mall, and a 10-foot sidewalk along the south side, facing the Falls. The span is practically level and even with the natural top level of the gorge. With no superstructure other than the railings, the falls and river below will be in full view.

There will be twelve approach traffic lanes on the New York side and fourteen on the Ontario side, to facilitate government inspection. Facilities will be provided at each terminal for housing toll collectors, government inspectors and other officials, and also concessions rendering services to travelers.

Personnel

The Rainbow Bridge was built under the auspices of the Niagara Falls Bridge Commission which was created by a Joint Resolution of the Congress, Third Session, authorizing it to construct, maintain and operate a bridge and approaches across the Niagara River between Niagara Falls, N. Y., and Niagara Falls, Ontario. The project was financed by the proceeds of bonds issued and sold by the Commission to the amount of \$4,000,000.

The site for the bridge was dedicated by Their Majesties King George VI and Queen Elizabeth when they visited Canada and the United States in 1939 and a monument at the Canadian terminal commemorates this event. Ground was broken for the bridge on May 16, 1940, and the first steel was placed in position on February 17, 1941.

Waddell & Hardesty of New York City were the designing engineers and, with the Edward P. Lupfer Corp. of Buffalo, N. Y., also served as consulting engineers. Aymar Embury II of New York City was Consulting Architect, a group of architects headed by Russell Goodwin Larke were architects for the American plaza and approach and Lyon Somerville of Toronto, Ontario, was architect for the Canadian plaza and approach. Parsons, Klapp, Brinckerhoff & Douglas of New York City are the traffic engineers.

The McLain Construction Co. of Buffalo, N. Y., was contractor for the foundation and concrete approaches on the American side, Aiken & McLachlan Ltd.

of St. Catharines, Ont., was contractor for the foundation and approaches on the Canadian side, and the Bethlehem Steel Co. was contractor for the steel arch span, with the Canadian Bridge Co. of Walkerville, Ont., associated with it in the fabrication of the steel manufactured in Canada.

Brooks Equip. President Dies; Succeeded by Brother

Announcement has been made by the Brooks Equipment & Mfg. Co., Knoxville, Tenn., of the death on July 21 of L. W. Brooks, President of the company. E. N. Brooks, formerly Executive Vice President and General Manager, has been elected to succeed his brother as President and General Manager. Other officers elected at a recent meeting of the company include Karl R. Martin, Executive Vice President and Treasurer; R. S. Tucker, Vice President in charge of sales; Dorothy Brooks Kirby, Secretary; and Richard G. Howes, Assistant Secretary and Treasurer.

Machinery for Quarry. Sand and Gravel Pits

Telsmith equipment for quarries, sand and gravel pits is described in detail in a new illustrated bulletin recently issued by the Smith Engineering Works, 4014 N. Holton St., Milwaukee, Wis. This line includes the Telsmith primary breaker, a gyratory crusher of the pillar-shaft type, the Telsmith reduction crusher and Gyrasphere crusher, Wheeling jaw crushers, double roll crushers, pulsators, dry and washing screens, grizzlies, scrubbers, sand classifiers, feeders, belt elevators and conveyors, and Telsmith mounted and semi-portable crushing plants. Each piece of equipment is described, illustrated and complete specifications are given. In the back of the bulletin are two questionnaires that can be filled out by those desiring information on equipment for a quarry or gravel plant.

Copies of this bulletin, No. 266M, may be obtained by writing direct to the manufacturer.

MARMON-HERRINGTON All-Wheel-Drive



AMERICA MUSTERS HER
SHOCK TROOPS FOR THE
GREAT OFFENSIVE AGAINST

"General" Snow



"General" Snow is nothing to smile about in our northern tiers of states, where the blinding, clinging menace piles deep on highways and streets. To keep roads open and traffic moving requires heroic effort by snow-removal crews, sometimes for months at a stretch.

But given the right kind of equipment to work with, these men face the worst blizzards with courage and confidence. Even the deepest drifts are swept clear with plows mounted in front of sure-footed, fast moving Marmon-Herrington All-Wheel-Drive trucks.

For these economical, sturdy and dependable

vehicles have the ability to maintain traction, without excessive loading, even on the slipperiest pavements. With all four or all six wheels actually taking hold and pulling, Marmon-Herringtons keep going when conventional drive vehicles would be stopped dead in their tracks.

We convert all standard Ford trucks to All-Wheel-Drive, and build a complete line of extra heavy duty All-Wheel-Drive vehicles in our Indianapolis plant. All standard types of rotary and V-plows are adaptable to these units. With snow-removal equipment dismantled the same vehicles are available for year around road construction and maintenance, where their superior traction enables them to do work no other wheeled vehicle can do. Literature describing all of these vehicles will be mailed on request. New issue Marmon-Herrington Pictorial News shows many snow-removal units in action.

CUMMER ASPHALT PLANTS

Portable Combination Hot
and Cold Mix Plants

Portable Hot Mix Plants

Stationary Combination
Hot and Cold Mix Plants

Cummer Combination
Dryer-Coolers.

Steam Jacketed Mixers 400
to 8000 pounds capacity.

Cummer Internal Fire Dryers

Electric Batch Timers

THE F. D. CUMMER & SON CO.

Euclid and 17th, Cleveland, Ohio

MARMON-HERRINGTON CO., INC. • INDIANAPOLIS, INDIANA, U. S. A.

Paving Runways and Aprons At New Washington Airport

Asphaltic-Concrete Paving Of All Runways and Aprons Done by Two Contractors Under Supervision of PRA

THE foundation material for the Washington National Airport, dredged from the Potomac River, which has been the source of practically all concrete aggregate used in the Capital district for many years, was further strengthened beneath the runways before paving by stabilizing to a depth of 9 inches, using sandy clay from a hill on the airport property. On this stabilized area the 688,000 square yards of runway and other pavement of asphaltic concrete was laid. Under the first contract, awarded to Warren Brothers Paving Co. of Cambridge, Mass., an asphalt plant was set up at the airport, using dredged screened aggregate in the mix. The second contract was awarded to Corson & Gruman of Washington, D. C., which used its own central mixing plant located in the District of Columbia.

The work of stabilization as well as paving was done in three 8-hour shifts, so that provision for intensive illumination at those points where work was active was necessary. The stringing of poles and wires around the field would have greatly hindered operations, and so thirty portable lighting plants and floodlight towers were designed. On the platform at the base of the towers, a Kohler 30-ampere 250-volt gas-electric generator set was installed to supply current to the four 500-watt electric lights mounted with their reflectors at the top of the tower. The bases were originally made of 4 x 8's to be used as skids. However, when the runways were completed, it was found that the towers could be moved more readily and with less damage to the runways by mounting them on pneumatic tires, as shown in the illustration. A 30-gallon gas tank outside the shack protecting the generator provided ample fuel for long periods of operation.

Just prior to the grading operations, it was necessary to move 1.6 miles of the Mount Vernon highway from the airport in order to provide a free flow for through traffic and also to make available additional space for the buildings at the airport. A total of 2,165,000

cubic yards of dry excavation and fill was made for landscaping roads and the building areas.

Stabilization

The material dredged from the river was about 40 per cent well-graded gravel, 30 per cent sand, and 30 per cent silt which washed out of the dredged material as it was deposited, leaving a final ratio of about 60 per cent sand to 40 per cent gravel. To give this adequate strength, the runway areas were stabilized to a depth of 9 inches by the addition of binder soil, top soil, and sandy clay from a hill on

the airport which was graded down by the PRA. As a result of the stabilization, an average density of 133 pounds per cubic foot was secured. Stabilization was done by force account under the direction of the U. S. Engineer Department.

The runway area was thoroughly scarified to a depth of 9 to 12 inches by 4-gang plows, rippers, and rooters, and all of the stones over 3 inches removed and the area shaped to final grade with power graders. The material to be added from the hill was loaded by hand into Dempster-Dumpsters. Careful soil analyses were made of the runway area, which was divided into 25-foot squares. The material from the hill having been previously analyzed, it was possible to allot a certain number of loads of the material per square to give the maximum density when the material was mixed with the base material to a depth of 9 inches. The added material was spread by hand on top and then mixed with four passes of a 28-inch Rome disk, during which time a 1½-



C. & E. M. Photo
One of the thirty portable electric lighting plants which provided illumination for night shifts during stabilization of the base and paving of the runways at the Washington, D. C., airport.

ton truck with a tank and pipe sprinkler was run over the surface to give the
(Concluded on page 42)

POPULAR H10!



Justly popular is this 45-pound Cleveland Sinker, with owners and operators alike. A fast driller, sturdily built, easy to hold, with effective hole-cleaning power and strong rotation, the H10 consistently wins in point of footage per day. Both dry and wet types are available. Chuck for 1" Hexagon x 4¼" is standard, but the smaller 7/8" Hexagon x 3¼" is supplied when specified. Good for holes to depths of 18 feet and more, in any kind of rock. Despite the demand, we are making unexpectedly prompt deliveries. Wire us where to demonstrate.

Bulletin 122 sent on request. It gives complete information on all types of Cleveland Sinkers.

CANADIAN DISTRIBUTORS

Purves E. Ritchie & Son, Ltd.
658 Hornby St., Vancouver, B. C.
Whitehall Machine & Tools, Ltd.
Galt, Ontario

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CABLE ADDRESS • "ROCKDRILL"

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THE STRONGEST
GEARED
POWER
FOR ITS
WEIGHT
IN THE
WORLD

SEATTLE U.S.A.

COMPACT—POWERFUL—SAFE
"For use where power is not practical or available"
Manufactured in 2, 5 and 15-Ton Sizes.
For capacity comparison, ½" cable used:
2-Ton "Lightweight" 75 ft.
5-Ton "General Utility" 250 ft.
15-Ton Triple-Geared "Special" 1200 ft.
Patent instant gear change and positive
internal brake that never fails, and will
lock load.
Gear Ratios Weight Price, f.o.b.
2-Ton 4. & 22 to 1 60 lb. \$ 50
5-Ton 4. & 24 to 1 110 lb. \$ 75
15-Ton 4. 19 & 109 to 1 680 lb. \$250

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2724 6th Ave., So., SEATTLE, WASH.
Warehouse stocks for dealers' supply: Seattle—
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and List of Dealers in Principal U. S.
Cities and Foreign Countries Gladly Mailed.

Concreting Plants For Work at Quonset

(Continued from page 11)

heated to 160 degrees Fahrenheit by steam admitted to the center of the tank and controlled by a hand valve. A pressure relief valve on the pump line wasted cold water back to the pond when heated water was not being withdrawn from the tank. A safety valve at the top of the tank prevented possible damage if the tank had become over-heated. An insulated line from near the top of the heating tank delivered the hot water to the batching tanks.

One of the boiler plants, equipped with a 100-hp and a 40-hp coal-fired boiler, supplied the steam for the pipe grill underneath the aggregate piles at night and also during the day when the temperature was below freezing. This raw steam kept the piles from freezing and maintained a uniform moisture content in the aggregate. A separate boiler house closer to the batching plants and equipped with a 50-hp boiler was used for boosting the temperature of the mixing water in the calibrated tanks.

The two dispatchers kept a careful record of the trucks as they took their loads from the plants. The clerk took the orders for concrete required for the following day, according to the specification numbers, and then gave these to the two truck dispatchers who assigned trucks to various projects so that each truck handled one type of concrete throughout the day. A duplicate of this was given to the batch man with the number of the truck, so that he always supplied the specified batch to the truck by number. This system worked out very satisfactorily, but required unusual keenness on the part of the batch men because the trucks never arrived at the plants in the same sequence.

The Repair Shop

Adjacent to Plant No. 2 was a galvanized-iron building with 12-foot stalls for the seventeen truck mixers, and two extra stalls, one of which was used for repair work and the other for storing the crawler tractor with its bulldozer used on the stockpiles. The two diesel mechanics were able to keep this fleet of

seventeen trucks in continuous operation throughout the work, with practically no delays. In front of the repair shop and garage was a 1,000-gallon gasoline tank and a diesel fuel tank of the same size, with metered pumps, so that the concrete plant operated as a complete unit, fueling and servicing its trucks and the plant equipment without dependence on any other part of the job.

Personnel

We have seldom had the opportunity of visiting a project working at such speed where there was such a spirit of unity and teamwork between all parties involved. The Office of Design and Construction of the Navy was ready at all times to facilitate the work of the contractor who in turn took every precaution to prevent shut-down of any part of the work in order to speed the completion of the various projects which make up the development of this vast Naval Air Station.

For the United States Navy, Commander Raymond V. Miller, C.E.C., was

Officer in Charge of Construction. The associated contractors for the Quonset Naval Air Station were George A. Fuller Co. and Merritt-Chapman & Scott Corp., with E. Walter Hammer as Project Manager.

New Catalog Describes New Dirt-Moving Method

Thirty-seven field photos of Traxcavators in action feature a new catalog just issued by the Trackson Co., 3343 So. Chase Ave., Milwaukee, Wis. These pictures, backed up by engineering facts in the technical specifications of the giant 2½-yard T7 model, the ¾-yard T4, and the ½-yard T2, tell the story of the various kinds of jobs for which this unit is designed, including excavating, loading, scraping, bulldozing, dirt-moving, material-handling, and snow removal. These rugged tractor-shovels, for operation with Caterpillar D7, D4 and D2 diesel-powered tractors, are highly mobile, can travel around a job on their own power at speeds up to 6 miles an

hour, and can be readily transported over the highway from job to job.

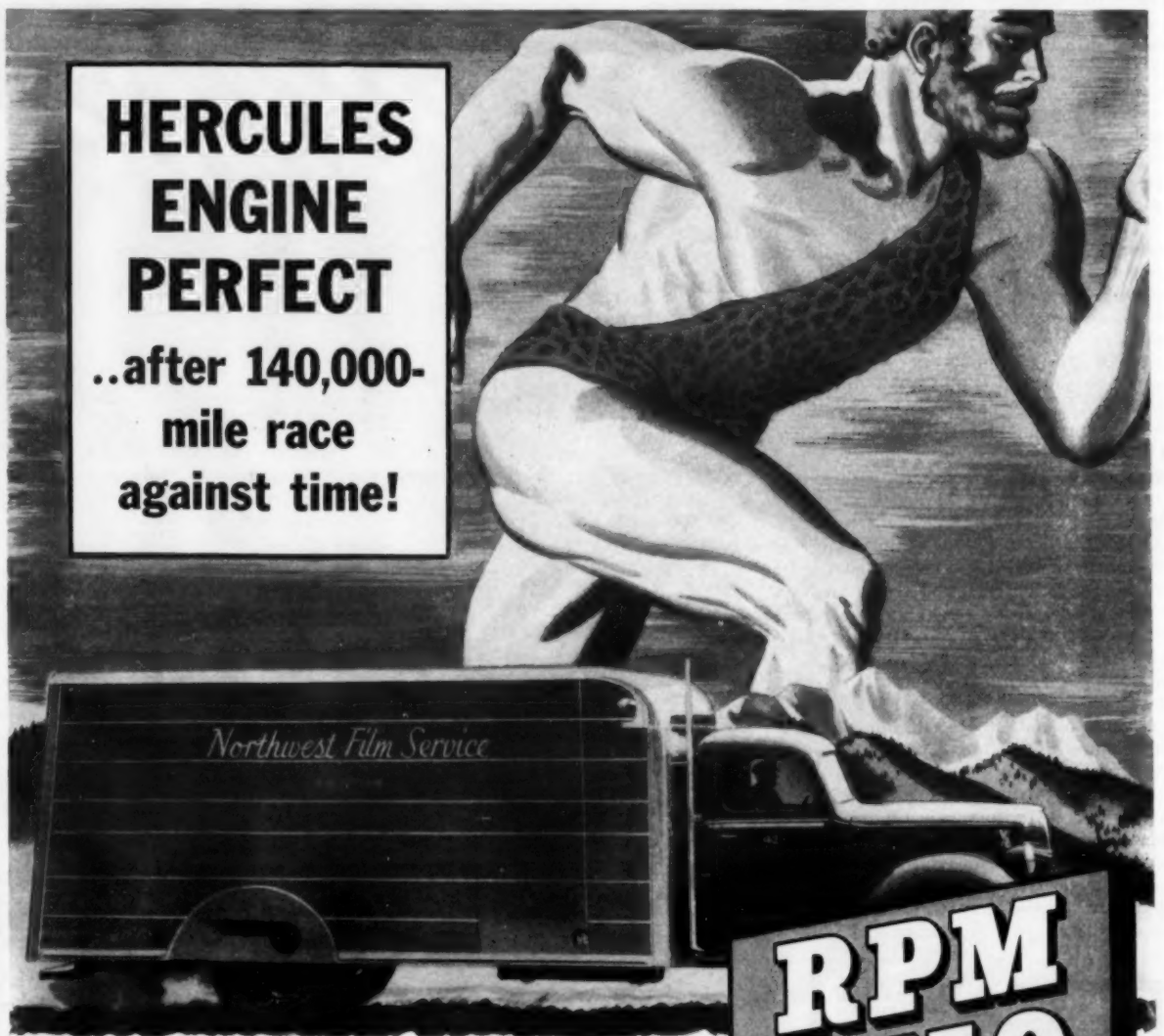
Copies of this new Traxcavator catalog, which suggests ways of speeding up defense construction by facilitating material-handling and dirt-moving on such work, may be secured direct from the manufacturer.

Burma Road Must Stay Open

The Burma Road is the most important road in the world today, said Harrison Lakin, formerly connected with the Foreign Diplomatic Service, in an address to the Maine Good Roads Association. This route is 1,200 miles long and has a maintenance crew of 1,300,000 Chinese on the job constantly 24 hours a day. If bridges are damaged in the heavy bombardment to which the Japanese are subjecting this road, in-going supplies are carried down one bank of the river, across and up the other side by Chinese labor gangs, Mr. Lakin said. Nothing is allowed to break this vital supply line to China.

HERCULES ENGINE PERFECT

..after 140,000-
mile race
against time!



HAVE YOU a herculean Diesel job? One where you **MUST** hit the ball day after day—one where costs must be kept 'way down... then see how RPM DELO helped the Northwest Film Service of Seattle:

Their job is to distribute films on a lightning-fast schedule—mile after mile—week after week—across rugged mountain ranges—all over the State of Washington. And do it at the gruelling rate of 10,000 miles a month—using one lone truck powered with a Hercules motor. Difficulties, now and then? Costly trouble? Not in 14 months! Not in 140,000 miles!

No wonder Fred J. Londry, executive of the film company, writes in! Yes, and he gives enthusiastic credit to his Hercules Diesel—and to RPM DELO that made this record performance possible!

So here's a tip—next time call for RPM DELO—the oil that ends ring, bearing and sludge trouble. Watch it cut costs.

RPM DELO

REG. TRADE MARK
DIESEL ENGINE LUBRICATING OIL

ORDER RPM DELO Unequaled FOR YOUR DIESELS

Approved by the makers of over 95% of the installed Diesel horsepower in America, RPM DELO is marketed under the following names:

RPM DELO
Kysco RPM DELO • Sohio RPM DELO
Signal RPM DELO • Caltex RPM DELO
Imperial RPM DELO

Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your locality.

FOR

Mixed-in-Place CONSTRUCTION

ARIENS
AGGMIXER



It does the
job Thoroughly,
Rapidly,
and Economically.

It operates with other general purpose road equipment—from power take-off shaft of any suitable tractor—easy and safe to operate. The swirling chopping action of Aggmixer tines does a thorough job of mixing—wet or dry. Send for job facts now.

**ARIENS COMPANY,
BRILLION, WISCONSIN**

STANDARD OIL COMPANY OF CALIFORNIA

Heavy Cuts in Ledge On U. S.-Penna. Route

A. Guthrie & Co. Push First 3 Miles West of Mt. Union To Pave Before Winter; the Other 4 Miles, New Location

(Photos on pages 1 and 44)

A CONTRACT for grading and paving 7.17 miles on U.S. 22 near Mt. Union, Penna., with 33-foot concrete slab, and a short section of 44-foot slab, was awarded to A. Guthrie & Co., Inc., of St. Paul, Minn., on June 24, 1940, with 200 working days allowed. As the 2 3/4 miles west of the junction of U.S. 522 and U.S. 22 is mostly on the old location, the word was to "grade and pave before snow," then complete the grading on the new location before January 1, 1941, and pave in the spring. The first 2 3/4 miles required moving 280,000 cubic yards, mostly rock, in narrow cuts while the balance of the total of 786,000 cubic yards was in the remaining 5 miles of the job which was much wider, and therefore more easily handled.

Hard Rock to Drill

The rock in sections of this job was exceedingly hard, making it necessary to use one detachable bit for each 2 to 3 inches in the 20-foot holes in a high-silica rock locally known as Ganister. On one section where an Ingersoll-Rand wagon drill was employed the bits wore out in 60 to 70 seconds of drilling. For the deep holes a Bucyrus-Erie 6-inch well drill was used in shale up to 30 feet deep, where the slope of the shale strata was about 45 degrees to the vertical drill hole.

Air for the four Ingersoll-Rand Jackhammers, equipped with I-R detachable bits, was furnished by a Model 315A Ingersoll-Rand 2-stage air-cooled compressor, and for the I-R wagon drills by an I-R 2-stage Model K500 air-cooled compressor, teamed with a Model 315. Perhaps the prize story for difficult drilling went to one ledge where it required 18 bits on a single jackhammer to get 9 inches of hole. All the bits were shipped out for sharpening. In order to secure the maximum efficiency of the jackhammers, the manifold from the air line was equipped with oil reservoirs and the line shut down once an hour so that the reservoirs could be filled with No. 20 oil which had a noticeable effect almost immediately on the operation of the jackhammers.

Atlas 50 per cent gelatin dynamite was used in all of the holes, both in shale and in the hard rock, firing all groups of less than 50 holes with a hand battery and groups of more than 50 direct from one of the Kohler 1,500-watt lighting plants.

Shovel-Loading to Trucks

Three shovels were used for handling excavation on the job, including a Marion 1 3/4-yard, a Northwest 2 1/2-yard, and a Bucyrus-Erie 48-B. All these shovels worked in rock with faces varying from 8 to 10 feet.

The Marion 1 3/4-yard shovel, powered with a Waukesha-Hesselman engine, worked on an 8-foot face and loaded to four 10-yard Euclid trucks, with hauls as long as 2,600 feet but averaging between 1,500 and 2,000 feet. The trucks were able to work on both sides of the shovel, making loading faster than on some of the work farther along where other shovels had to work in more cramped quarters. Pennsylvania specifications for excavation make the whole job a grading unit so that there is no free haul and no overhaul. Each of the shovels worked three 7-hour shifts with the Marion getting out about 900 yards of the broken shale per shift.

The Northwest Model 80 2 1/2-yard shovel worked in rather close quarters, loading three Euclid end-dump 10-yard



C. & E. M. Photo

Three of a battery of four I-R wagon drills used by A. Guthrie & Co., for putting in holes at the base of a hard ledge on its 7.17-mile grading and paving contract near Mt. Union, Pennsylvania.

trucks. The Bucyrus-Erie 48-B loaded to four Athey 14-yard side-dump crawler wagons pulled by Caterpillar D8 tractors, with hauls as great as 1/2 mile.

The dirt-moving outfit on the job consisted of three 12-yard Gar Wood scrapers pulled by D8 tractors. Working on

(Continued on page 34)

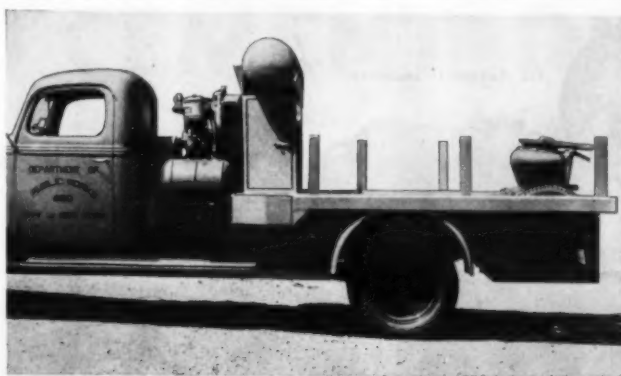


ILLUSTRATION: Hercules "Cretemobile" for application of Gunite. Assembly includes air compressor and Cement Gun, operated from the truck motor by a Direct Drive (Model D-700) Split Shaft Power Take-off.

Split Shaft Power Take-offs transmit the full horsepower and torque of the truck motor for operation of truck-mounted air compressors, electric welders, winches, pumps, rock crushers, cement mixers, etc. Direct (D-700 series), Side (D-800 series) and Dual Drive units are available for installation in all standard make truck chassis. Dual Drive units permit simultaneous power transmission to both rear wheels and equipment. Either truck or equipment may also be operated independently. Recommendations and complete specifications furnished upon request.

* SPLIT SHAFT POWER TAKE-OFF SPECIFICATIONS *

* Suffix "B" indicates Dual Drive

Model	Minimum W.B.	Max. H.P. Transmitted	Maximum Torque	Motor R. P. M.	Speed Ratio	Bare Weight	Direction of Rotation
D-700	133"	76	220 ft. lbs.	2000	1 to 1	145 lbs.	Same as Drive Shaft
D-700-B*	133"	76	220 ft. lbs.	2000	1 to 1	151 lbs.	Same as Drive Shaft
D-775	133"	190	500 ft. lbs.	2000	1 to 1	211 lbs.	Same as Drive Shaft
D-775-B*	133"	190	500 ft. lbs.	2000	1 to 1	216 lbs.	Same as Drive Shaft
D-800	133"	76	220 ft. lbs.	2000	1 to 1	296 lbs.	Counter Clockwise on Right
D-875	133"	120	350 ft. lbs.	1800	1 to 1	311 lbs.	Counter Clockwise on Right

HERCULES POWER TAKE OFF

Take-offs are installed in a portion of the truck drive shaft, with driving sleeve on the take-off drive shaft. Pulley or sprocket is attached to sleeve from 1 1/2" to 6" behind truck cab. V-belt or chain drive to equipment.

SPLIT-SHAFT

Model D-700 Direct Drive unit illustrated. Both medium and heavy duty models available.

Hercules Power Take-offs may be ordered as standard equipment from many portable equipment and truck manufacturers. Bare unit prices from \$200.00 to \$350.00 depending on type of unit required.

HERCULES STEEL PRODUCTS CO. GALION, OHIO

The Original BucketruX

Trade **DEMPSTER** Mark
DUMPSTER
Reg. No. 353406

Mfgd. by

DEMPSTER BROTHERS, Inc.
Knoxville, Tenn.

Conn. District Garage Serves Seven Sections

(Continued from page 13)

brake machine, a Black & Decker valve refacer, a buffer and grinding wheel combination mounted on a riveted and welded stand of light structural steel, making it easier to operate than if mounted on a bench, a small speed lathe, a U. S. Air Compressor Co. garage compressor, a welding table and a rip saw rig. All of this power equipment is driven from a jack shaft actuated by a large electric motor. Included in the maintenance equipment is an Allen electric welder.

A steel rack is tucked in at one side of the machine shop proper for the storage of cold rolled steel and tool steel. In addition there are three and four-shelf frames on casters which can be placed between trucks which are in for repairs and are used for the storage of parts, keeping them off the floor and, therefore, cleaner and less liable to be lost.

In winter a night shift is maintained at the garage with two mechanics and a mechanic's helper. Their principal duties are to facilitate the dispatching and maintenance of snow-plowing equipment.

Near the center of the machine-shop section of the garage is a toilet and a wash sink with hot and cold running water piped together in a novel manner with a single brass pipe connecting the two faucets and then suspended below it a longer pipe perforated along the bottom so that four men can wash at the sink at the same time. There are two long workbenches along the back of the garage divided by the door from the boiler room and the rear yard.

Among the smaller equipment in the garage is a portable structural steel frame, mounted on casters, with a screw geared chain hoist. This unit can be wheeled readily over the hood of a truck, the engine lifted out by the hoist and moved to any section for repairs. Whitaker electric cable reels are suspended at intervals along the ceiling for the trouble lights. A Tungal charger for six batteries is located at the west end of the garage and close by it a large sand box for fire fighting, and another large Buffalo 2-wheel foam-type fire extinguisher. Hand foam extinguishers are located at nearly a dozen places all over the

garage so that they may be reached quickly to stop a fire before it gains any headway.

Complete hand and pneumatic pressure lubrication equipment, with suitable compressed air piping, of a type that can be moved anywhere about the garage is used for the sake of convenience.

Parts and Small-Tool Storage

At the west end of the garage is the small-tool storage room where shovels, lanterns, pouring pots, picks, grub axes, stone forks and other necessary small tools are stored in racks, many of them near the top of the room to save space. One novel tool noted in this room was the cleaning iron that has been developed in this District. These irons are about 4 inches wide and are made from old grader blades hammered down to a thin edge and slightly bent at the end. These are mounted on handles made of 3 x 3 stock and are used for cutting excess asphalt from joints and cracks so that the bump so familiar in many

states which permit expansion joints to mushroom is completely eliminated from concrete pavements in the Branford District in Connecticut.

Adjacent to the storage room is the parts room and office. Steel bins have been erected for all the small parts, and even on top of them the larger ones are

piled all the way to the ceiling. Trays are mounted on sloping shelves for the complete sets of special drills and other equipment which comes in sets. When the mechanics need tools or parts they ring the bell, sign a check and the stock clerk issues the tool or part required.

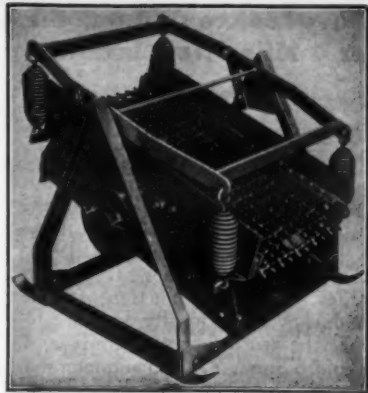
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3 Sizes, 100 Tons Per Day!

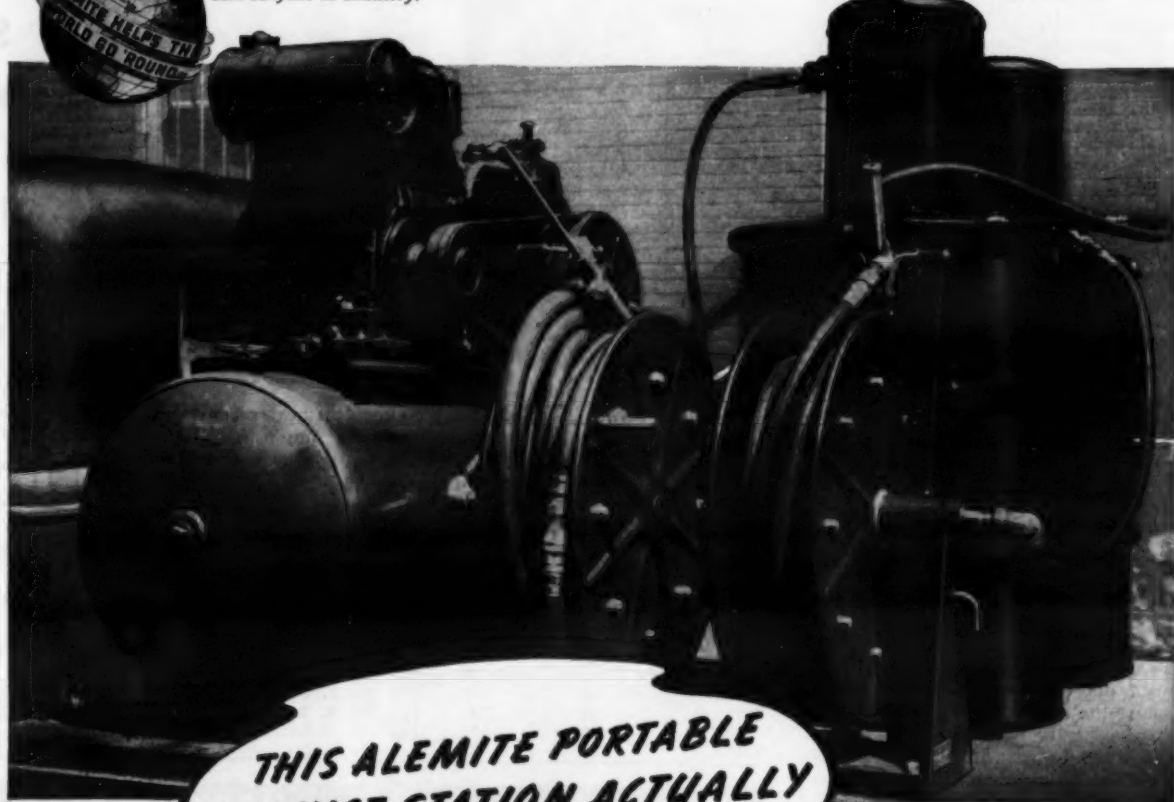
Yes, that's the capacity of this **Portable Vibrating Screen**, and it requires the power of only a 2 hp. gas engine or 1 hp. electric motor. Easily moved. For road and construction work, concrete block making, quarries, factories, etc.

Write for Bulletin No. 110

ROBINS CONVEYING BELT CO.
PASSAIC NEW JERSEY

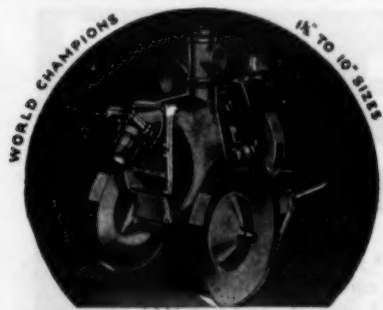


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Only JAEGER Pumps Have All These Features

- **JAEGER PRIMING JET**—Up to 5 times faster prime and re-prime—no adjustments, no need to "gun" engine.
- **POSITIVE RECIRCULATION CUT-OFF**—controlled by flow, not pressure.
- **LONG-LIFE SEAL**—Accessible for inspection.
- **PATENTED SELF-CLEANING SHELL**.
- **EVERY PUMP FACTORY TESTED** for high capacity and pressure.
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Send Today for Latest Catalog and Prices.

THE JAEGER MACHINE CO.
781 Dublin Ave., Columbus, Ohio

... and that's ONLY the lubrication labor saving!

WRITES the George W. Condon Co., of Omaha: "In lubrication labor time alone we were able to make a saving of 12 hours per day for 90 days—1080 hours at 67½¢ per hour—total net labor saving, \$729.00!

"Our experience has proved to us conclusively that, with the Alemite Portable Service Station dispensing all lubricants directly from their original drums, we are able to keep them absolutely free from contamination. This has resulted in a sub-

stantial reduction in maintenance, and lubricants used."

The Condon unit consists of one Alemite High Pressure Barrel Pump, one Alemite Low Pressure Barrel Pump, with 40-foot hose assemblies, controls, and special hose reels, together with gasoline powered air compressor, air hose, and equipment. Your own Alemite Portable Service Station can be made to fit your particular requirements—and can probably save its own cost in a matter of days or weeks! Let this modern method help you achieve greater results, in less time, at lower cost! Write for complete facts!

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Industrial LUBRICATION
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Alemite Giant Button Head Fitting for volume lubrication of tractor track roll bearings.

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ROBINS



C. & E. M. Photo
Dunking guard rail posts in creosote
at the State Highway Department Dis-
trict Garage at Branford, Conn.

Creosoting Wood Posts At Conn. District Garage

(Continued from preceding page)

Material is all charged to the piece of equipment on which it is used as is also gas and oil which are issued from this same office.

Method of Creosoting Posts

A simple and effective device for creosoting the bottom 4 feet 8 inches of guard rail posts, which does away with hand painting and permits the much more rapid and thorough creosoting of the posts, has been set up in the rear storage yard. It consists of a tank made by welding two 30-gallon oil drums, one above the other with the heads of the two drums where they come together removed, and above this a cover which protects the creosote left in the tank when it is not in use. The whole tank is set in and welded to a 50-gallon drum which acts as a fire box. The weight of the tank of creosote is supported by four legs which are continued through the 50-gallon drum immediately beneath the drum. Inasmuch as the 50-gallon drum is so much larger in diameter than the 30-gallon drums, a heating space is furnished around the outside of the lower section of the creosoting tanks. Wood is used in the bottom of the 50-gallon drum which serves as a fire box. A flue of small corrugated iron pipe is welded to one side of the 50-gallon drum and extends to a vertical stack of the same kind of pipe set in a section of vitrified pipe as a base.

To permit the easy hoisting of the posts from the trucks and to "dunk" them in the creosote tank, an A-frame derrick has been rigged with a block and rope and a pair of tongs on the end of it for gripping the posts. When the device is in operation, one man sets the tongs in the top of the post, another man pulls on the tackle raising the post and then lowering it into the tank, and then as it is removed and allowed to drain for about a minute it is swung and dropped on a pair of timbers at one side and then picked up by two men with tongs and stored for curing.

District Equipment Roster

The mobile equipment in the Branford District consists largely of trucks, of which there are ten GMC Model 61 5-ton trucks with dump bodies and fourteen GMC Models 46 and 701 trucks, which are similarly equipped. A pusher plow is provided for each of these trucks so that they may perform their maintenance work both summer and winter. There are also three FWD trucks with V-type plows. The District has an Auto-

car-Littleford 1,300-gallon oil distributor which is used for distribution of bitumen in surface maintenance. There are one Ford and one Chevrolet pick-up trucks for general service. The District has nine light and heavy graders, one Good Roads and four Littleford 50-gallon portable asphalt kettles, one Hvass rotary sweeper, an Ingersoll-Rand portable air compressor with two I-R jackhammers and pavement breakers. A Reliance sand spreader, a Portable Machinery Co. 18-foot loader, and a Chicago automatic loader of the same size are also included. There are three Jaeger concrete mixers, one one-bag and two two-bag units.

Personnel

The District Garage of the Connecticut Highway Department at Branford, Conn., is in charge of William Carsten, District Supervisor, with Anthony "Tony" Stegina as Acting Foreman.

When writing to advertisers, please mention this magazine.

STERLING BALANCED WHEELBARROWS



All trays have double thickness at corners. Both laps are crimped over a continuous butt-welded reinforcing rod.

No. S-12 Barrow—For Dry Materials
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STERLING WHEELBARROW CO., MILWAUKEE, WIS.

CEMENT DISPERSION

ASSURED QUALITY CONCRETE WITH SPEED AND ECONOMY ON THIS GARY, INDIANA JOB

Permanent Construction Co., Chicago, Ill., Contractors on the Gary Sewage Treatment Plant state:—

"The addition of Pozzolith increased the workability and placeability of the concrete with no increase in the water cement ratio, greatly facilitating the placing and finishing operations."

The experience of the Permanent Construction Co. is not unusual.

Hundreds of contractors have benefited similarly since POZZOLITH was introduced ten years ago. Higher quality concrete at lowered costs has been achieved by contractors on many important jobs as a result of this outstanding technologic achievement.

SPEED WITH ECONOMY

Today POZZOLITH is recognized by important authorities as a vital aid in speeding up the national defense program. It is being included in numerous giant defense projects as well as in public and private construction.

In addition to speeding up the job, often at substantial savings, POZZOLITH produces five vital advantages as listed at left.

The complete story of Cement Dispersion and POZZOLITH will be sent on request. Ask for the facts on how to make substantial savings with POZZOLITH.

THE MASTER BUILDERS COMPANY
CLEVELAND, OHIO TORONTO, CANADA

HOW POZZOLITH WORKS

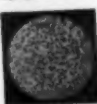


UNDISPERSED See microphotograph at left.

Pozzolith contains Master Builders' cement dispersing agent. Cement particles in their normal state in water tend to gather together in bunches, i.e., flocculate. This bunching entraps water within the particle clumps.

With Master Builders' dispersing agent these bunches are broken up into individual cement particles distributed throughout the water, i.e., dispersed or deflocculated. See microphotograph at right.

This dispersion makes the cement usable to its full efficiency; all the cement surface is made available for hydration and all the water for lubrication of the mix. (Water held within the particle clumps is released.)



DISPERSED

FIVE ADVANTAGES

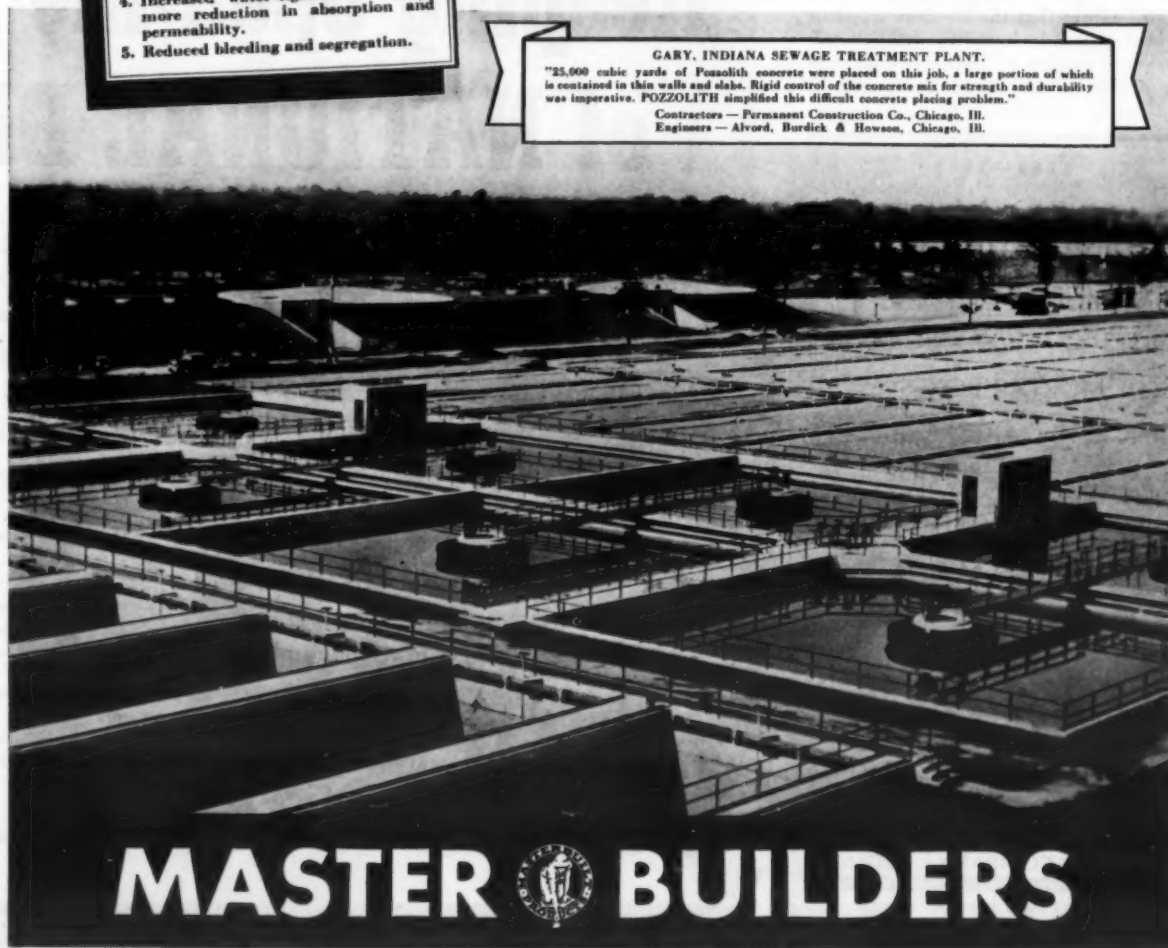
As a result of adding Pozzolith to cement mixes there occur these five advantages:

1. Durability increased 50% or more.
2. High Early Strength—20% or more increase in compressive strength at all ages.
3. Water reduction, up to 20%—slump increased 150% or more for given water ratio.
4. Increased water-tightness—30% or more reduction in absorption and permeability.
5. Reduced bleeding and segregation.

GARY, INDIANA SEWAGE TREATMENT PLANT.

"25,000 cubic yards of Pozzolith concrete were placed on this job, a large portion of which is contained in thin walls and slabs. Rigid control of the concrete mix for strength and durability was imperative. POZZOLITH simplified this difficult concrete placing problem."

Contractors—Permanent Construction Co., Chicago, Ill.
Engineers—Alford, Burdick & Howson, Chicago, Ill.



MASTER BUILDERS



One of the new Gar Wood arm-type hydraulic hoists for dump bodies.

New Arm-Type Hoists For Dump-Body Trucks

Several new arm-type hydraulic hoist models for use on 1½ to 2-ton truck chassis and especially adaptable for dump bodies 8 to 10 feet in length have been announced recently by the Hoist & Body Division, Gar Wood Industries, Inc., Detroit, Mich.

The new arm-type hoists are made in three sizes, D6R, D7R and D7LR, and involve a new and exclusive type of lifting arrangement, according to the manufacturer. It is stated that the lifting effort is considerably reduced, due to the body being lifted further forward, and the lifting effort, which is disseminated over a greater area, is confined within the self-contained assembly of the hoist unit.

Other features include minimum stress on body and hinges and on the truck chassis frame, longer lever arm, fewer working parts, fast operation, minimum oil pressure, low mounting and minimum weight.

A new Gar Wood bulletin, No. 29, describing and illustrating these new arm-type hoist models may be secured by interested contractors and state, county and town highway officials direct from the manufacturer.

Light-Weight Air Hose

A new light-weight air hose, said to be so flexible that the ½-inch size can be bent to a 3-inch radius without collapsing or cutting off the air supply, has recently been announced by the B. F.

Goodrich Co., Akron, Ohio. The hose has been designed so that strength and efficiency are combined with minimum weight and ease of handling, according to the manufacturer.

Light gray in color, this new hose is stocked in ½ and ¾-inch sizes and can withstand working pressures from 80 to 125 pounds. The compound of the tube is of oil-resistant rubber, with marked heat-resisting characteristics. Yarn reinforcement affords a safety factor of more than five to one under a working pressure of 125 pounds, it is stated, while the golden ply insulation has been especially developed to assist in flexibility and resistance to kinking.

New Ransome Virginia Dealer

The Highway Machinery & Supply Co., Inc., 1724 Altamont Ave., Richmond, Va., has recently been appointed exclusive distributor in the state of Virginia of the complete line of concrete equipment made by the Ransome Concrete Machinery Co., Dunellen, N. J.

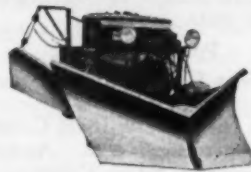
Hobart Monthly Contest For Arc Welding News

Cash prizes totaling \$200 or more a month are being offered by Hobart Bros. Co. for interesting news items about arc welding applications. A first prize of \$100, a second of \$50, a third of \$25, a fourth of \$15, and a fifth of \$10 are distributed every month and, in addition, special awards are made for en-

tries deemed worthy of purchase by the judges. No lengthy essay or technical data is required; just a short statement of how arc welding was used on the job for the repair or maintenance of equipment, or any other interesting application.

Official entry blanks and contest rules may be secured direct from the Contest Manager, Hobart Bros. Co., Box CE-81, Troy, Ohio.

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Right now is the time to place your snow plow orders for next winter. We can make satisfactory deliveries on a considerable volume of Davenport-Frink Sno-Plows—providing the orders reach us soon. These finer plows insure EASIER, FASTER and CLEANER snow removal. ACT NOW.

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Keeping open the highways of NATIONAL DEFENSE

To provide for the army that "travels on its stomach," food and material must use the highways, railways and airways. Keeping open these lines of communication is vital to national preparedness, and in all three, GOHI Corrugated Pipe contributes its share, by providing drainage structures to safeguard highways, railway road beds and airports. Buried in the ground, withstanding wear, weather, corrosion, abrasion, the impact of heavy travel, settling and shifting earth, sudden changes in temperature, alter-

nate thawing and freezing, and a score of other destructive conditions, GOHI Corrugated Pipe earns its service stripes for duty ably performed.

A copy of the 72-page GOHI Book on drainage practice is yours for the asking. Well worth writing for. Address the fabricator nearest you.

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The Newport Culvert Co. Newport, Ky.

GOHI PIPE

CORRUGATED

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Chicago New York Kansas City Boston Minneapolis Philadelphia San Francisco Los Angeles

Avoid Legal Pitfalls

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Edited by A. L. H. STREET, Attorney-at-Law.

Liability to Visitors

At a Construction Site

There is a limit beyond which an occupant of premises need not go to safeguard the safety of visitors, even though they be invited. One visiting the front-line trenches of a battle-field cannot expect the same freedom from risk of being hurt as he might expect if invited into a private home to play ping-pong. Nor can the visitor to a site where construction work is in progress expect to be as safe as if he were strolling through a park.

A suit for damages was brought against a general contractor by a chap who tumbled into an excavation for a foundation while leaving a site after having applied for employment by a subcontracting firm. In dismissing the suit, the Massachusetts Supreme Judicial Court said (*Forgione v. Frankini Construction Co.*, 30 N. E. 2d, 819):

"One who enters upon premises where construction is going on must expect to encounter the conditions and risks that naturally result from the manner in which the work is openly and visibly being performed. He cannot rely upon barriers and safeguards which he might reasonably expect to find in a completed building, but which it is impossible or impracticable to maintain at various stages of construction. . . . So far as appears, there was no wrought path or designated course such as might convey to plaintiff some representation or assurance of safety. He chose his own course through an area where the work consisted of making holes and partially filling them with concrete."

Omitted Contract Clauses

When it is understood between a contractor and an owner that work covered by a written agreement is not to be performed in a given eventuality—for example, in case the owner fails to secure the necessary site on which the job is to be done—a clause ought to be written into the agreement to show that the agreement is to be off on the conditions stated. But failure to insert such a clause will not necessarily make the contract binding if the eventuality which was orally agreed upon actually turns up.

In the case of *Senters v. Elkhorn & Jellico Coal Co.*, 145 S. W. 2d, 848, decided by the Kentucky Court of Appeals, a contract to construct a tram road grade for the defendant contained no clause that would nullify the contract, but the court decided that if it was actually agreed between the parties that the contract was to become effective only if the defendant should be able to secure a certain site for the road, and a clause embodying that fact was omitted from the written contract through mistake, the defendant could prove those facts and thereby relieve itself from liability on the ground of having broken the contract, if the site was not secured.

The court found it easier to reach a decision in favor of the owner in this case because the written contract was silent as to when and where the work was to be performed and paid for, thereby indicating that there were essential features of the agreement that had not been specified in the written document.

Let the Employee Beware!

Most accidents to contractors' employees come under workmen's compensation acts. In such cases, the question as to whose fault caused an injury is usually unimportant, unless fault of the employee has been so gross as to deprive him of right to an award, or fault of the employer has been so gross as to justify an increased award. But, occasionally, an accident is not covered by a workmen's compensation act, and, therefore, liability of the employer depends upon proof that his fault, and not the employee's own fault, caused the injury complained of. Such a case was passed upon by the Arkansas Supreme Court. (*McGeorge v. Henderson*, 145 S. W. 2d, 31.)

Henderson was injured while operating a fresno in sloping a road ditch, due to the blade hitting a small stump. He sued the contracting firm for which he was working and was awarded judgment for \$650, but the Supreme Court set the judgment aside, saying:

"Employers are not insurers of the safety of their employees and are not required to furnish a place in which to work which is free of every possible object on which one might possibly get hurt. Where, as here, the danger, if any, is perfectly open and obvious to the employee, as much so as it is to the employer, the risk of such an injury is assumed and there is no liability."

Of course, the quoted reasoning of the court does not apply to accidents covered by a workmen's compensation act. The theory of such laws is that maiming and killing of workers is as much an incident to industrial production as the cost of repairs and replacing machinery, and the cost should be borne by the industry, to be absorbed as part of the

cost of production, without stopping to split hairs as to just whose fault caused a particular accident.

Measuring Quantities

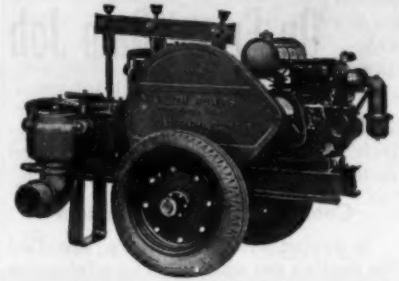
On a Construction Job

Theoretically, a cubic yard is a cubic yard. But when the parties to a construction job agree on a particular method of measurement, that method controls regardless of its accuracy.

In the case of *Franklin A. Snow Co. v. Commonwealth of Massachusetts*, 22 N. E. 2d, 599, the plaintiff contractor claimed that it had been "gypped" in the measurement of work done in constructing a baffle on a reservoir site. Measuring quantities by truck loads showed that the contractor had done more work than measurement by a planimeter showed. And it was contended that the first method of measurement was more nearly accurate than the latter.

But the contractor lost out on its claim, because the contract specified how the yardage was to be computed—by use of a planimeter—with excavated material to be measured in place before excavation, and embankments to be measured in position after compacting. "Measurement by a count of loads was thus excluded as a means of determining what was due to the contractor," declared the Massachusetts Supreme Judicial Court.

4" Single Mud Hog Pump on Pneumatic Wheels



The "Old Reliable" Mud Hog brought up to date.

Gearing enclosed—running in oil.

All cut gearing.

Die-forged crankshaft in pump.

Available in the ball valve Force type, or the flat valve Open Discharge.

Send for Bulletin No. CEM-40-D.

MARLOW PUMPS RIDGEWOOD, NEW JERSEY

U·S·S I-BEAM-LOK Open Floor in *another* record-breaking bridge



Bridge designed and construction supervised by R. L. Harding of Wilber Watson and Associates, Cleveland; Harry L. Dankon is County Engineer for Lorain County, the owners. Superstructure erected by Mt. Vernon Bridge Co.

... Reduces weight and wind resistance, saves money in America's longest highway bascule span... four-lane, double leaf, 333 ft. long

EVERY pound saved in the floor of this busy bridge at Lorain, Ohio, saves 2½ pounds in the counterweights, lifts 3½ pounds from the supporting structures. Used on bascule spans, U·S·S I-Beam-Lok Open Floor—which weighs only 18.6 lbs.* per sq. ft. — minimizes the dead weight of the bridge deck and makes possible substantial reductions in the size, and COST, of floor beams, trusses, foundations and operating machinery.

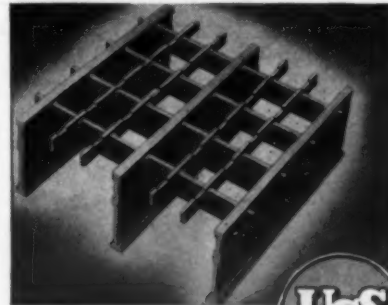
In addition to these savings, the U·S·S I-Beam-Lok Floor insures a sturdy, smooth-riding, fireproof roadway that cleans itself, that goes down easily, that can be used as soon as laid and that requires minimum care and maintenance.

To date almost 4,000,000 sq. ft. of I-Beam-Lok Open and Concrete-Filled Decks have been applied in some 430 installations. This is equivalent to nearly 33 miles of standard 22 ft. wide bridge roadway. It has been used to floor or re-floor bridges new and old, of every type and every size, from one end of this country to the other. It has also been applied to factory floors, wharves, docks and similar structures subjected to heavy duty or high-speed traffic. Our engineers will gladly discuss its economic possibilities with you.

*Concrete-filled I-Beam-Lok available in 2½", 3", 3½", and 4½" sizes, weighs respectively only 40.2, 47, 53.5, and 55 lbs. per sq. ft.

U·S·S I-BEAM-LOK OPEN FLOORING

This all-steel flooring is recommended wherever dead load must be kept to a minimum and where snow removal is a problem. It can be applied directly to the stringers on spacings up to 4' centers to permit H-20 loadings. The carrying I-beams are full 5 inches deep. Two supplementary bars running parallel to the tops of the I-beams produce an interlocked unit, with self-cleaning rectangular openings 1½" by 2¼" which will not clog up with dirt, debris, snow or ice. Large size of units, 6'2" wide up to 49' in length, makes possible fast handling and low-cost erection.



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STATES
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Pumicite Tried Out On Friant Dam Job

(Continued from page 15)

2. 3-inch maximum concrete; 3. 1½-inch maximum concrete for reinforced sections.

Cooling Water for Concrete

A unique system has been installed for cooling the water used in mixing the concrete, embodying three Vilter ice machines of the type used commercially in producing what is known as slush ice. Ammonia is expanded in a revolving cylinder contained in a housing while water is sprayed on the surface of the cylinder. This freezes into ice and a knife shaves it off to form slush ice, a continuous process. The slush ice is then added to the concrete mixing water, bringing its temperature down to approximately the freezing point.

Use of Pumicite

Friant Dam is a good place to try out the use of pumicite as there is an excellent deposit of it about 2 miles from the site of the dam. The volcanic dust had been deposited in a one-time lake and settled into stratified formation. All that was necessary was to strip a few feet of overburden from the old lake bottom and get in with a shovel. A P & H Model 700 with a 1¼-yard bucket is used, loading to two dump trucks which haul it to a hopper near the mixing plant. There the material is put through a single set of rolls and passes a ¾-inch opening. As obtained from the pit it is composed principally of small lumps which are crushed by the mixer action. The resulting product is exceedingly fine, finer even than cement. From the rolls it is transported to a steel silo from which it is fed onto a 24-inch belt and elevated to its bin in the batching plant.

There are a number of theoretical advantages at least to be gained by the admixture of pumicite with cement, and to a certain extent these theoretical advantages are being borne out in practice on this project.

When mixed with cement, pumicite acts as a cement to some extent. A mixture of 80 per cent cement and 20 per cent pumicite is said to reduce the heat generation in the concrete while setting. This being the case, it would permit earlier grouting and hence earlier completion. It has been estimated that the usual period of 60 days from time of pouring to time of cooling sufficiently for grouting might be reduced to 21 days. While much earlier cooling than usual is being secured on this dam, it is in part due to other factors.

This inert material, pumicite, mixed with cement is said to retain a sufficient amount of moisture to assist in curing. It is also said to improve the workability of the concrete. The material is so fine as to pass all but 5 per cent through a 325-mesh screen. Therefore it acts as a filler in the cement.

Pumicite affects the strength of the concrete considerably. The strength of ordinary 28-day concrete is about 4,500 pounds per square inch, and of pumicite concrete about 3,000 pounds. At 90 days they are about equal. The low early strength of the pumicite concrete means that the removal of forms is not safe until 36 hours after pouring as against 24 hours for ordinary cement, making this a minus point.

While it is true that less cement is required, whether or not this saving will make pumicite concrete more economical depends on the cost of laying down the pumicite and the cost of handling it and injecting it into the process.

It is safe to say that there is still a big question mark beside the use of pumicite concrete, but the Friant job is



Concrete at Friant Dam, part of the Central Valley Project in California, is placed in 1-foot thick terraces across the long blocks for each 5-foot lift.

likely to provide the answer to a good many of the questions about it.

Transporting and Hoisting Equipment

The concrete is transported in buckets by seven cars drawn by seven G-E loco-

motives powered by Caterpillar diesel electric power units. For hoisting the buckets on the trestle there are two Colby Steel & Engineering Co. cantilever cranes or hammerheads, with 294-foot

(Concluded on next page)

New A.R.B.A. Pamphlet on Motor Revenue Diversion

A new 4-page pamphlet containing some more facts about motor-revenue diversion has recently been issued by the Statistical Division of the American Road Builders' Association, and copies are available for free distribution. By means of maps and charts, as well as accompanying text, this pamphlet brings out the seriousness of the diversion situation by dramatizing what might have been done for our highway system with the \$1,341,838,048 of motor revenues which were diverted to other uses from 1925 through 1939.

Copies of this pamphlet, which should be distributed widely in the states which are still diverting such revenue and which have no prohibiting legislation, may be secured gratis from the American Road Builders' Association, International Building, Washington, D. C., or from CONTRACTORS AND ENGINEERS MONTHLY.



One of the larger wire rope manufacturers has recently proven conclusively that LUBRIPLATE 130-AA Lubricant retards corrosion and materially lengthens wire rope life.

LUBRIPLATE 130-AA is extremely adhesive and water resisting. It effectively seals in the original oil of the fibre core of the rope. It protects the wires from rust and corrosion, minimizes internal wear and will not wash off. Write today for facts and figures.

LUBRIPLATE DIVISION
FISKE BROTHERS REFINING CO.
NEWARK, N. J. TOLEDO, OHIO
Dealers from Coast to Coast

LUBRIPLATE
THE MODERN LUBRICANT
THAT ARRESTS PROGRESSIVE WEAR

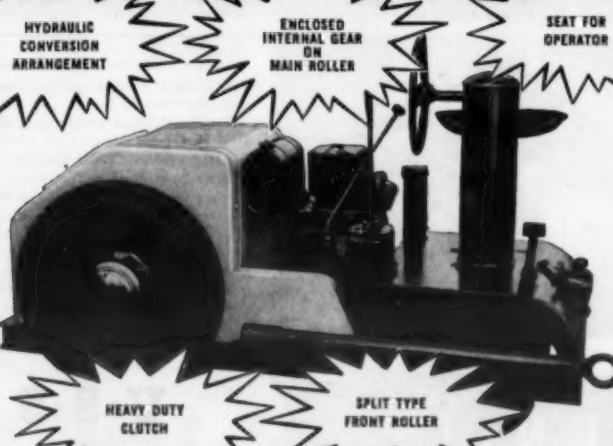


MICHIGAN mobile DRAGLINES
... for PEAK PRODUCTION

Extra work handled profitably with this fast-moving dragline—more passes, more yards per shift with Air Controls—Advanced design gives power and stability of heavier machines—Truck mobility puts it on jobs sooner. Ask for Work Book D, showing how MICHIGAN Draglines, convertible to all standard attachments, can pull extra profits your way!

MICHIGAN POWER SHOVEL CO.
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EXCLUSIVE FEATURES MAKE THE Trail-O-Roller THE BEST BUY



HYDRAULIC
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ENCLOSED
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The Model No. 155 Trail-O-Roller is the latest thing in patch rollers. Exclusive features make it the *Easiest to Handle*. No back breaking jacking up of roller. Trail-O-Roller has hydraulic lifting arrangement for changing from rolling to trailing position or vice versa. Trails safely behind a truck at any speed. For rolling street patches, service cuts, airport runways, shoulder widening, parking lots, alleys, etc., the Trail-O-Roller has no equal.



LITTLEFORD

LITTLEFORD BROS.
485 E. Pearl St. Cincinnati, Ohio

Placing the Concrete In Friant Dam, Calif.

(Continued from preceding page)

booms, brought from Grand Coulee and rebuilt, and in addition two new American revolver-type cranes with 125-foot booms.

Placing the Concrete

As much as 8,842 cubic yards of concrete have been placed in a day thus far, this record being set on July 12, and with continuing favorable conditions it is expected that at least 7,000 cubic yards will be handled on an average.

The concrete is poured in blocks 50 feet wide and of a length consisting of the full thickness of the dam, some of the lower blocks being 240 feet long. The lifts are 5 feet in thickness, poured in 1-foot layers. The layers are not poured clear across the block but, starting at the downstream end of the block, are poured in five terraces for a fraction of the distance, then another set of terraces and so on to completion. A crew of six men, including the foreman, works at each bucket. Two men work on each of two Chicago Pneumatic 519 vibrators while one man handles a smaller 419.

Cooling pipe is laid on top of each lift and river water is circulated continuously until the concrete is cooled down to within 8 degrees of river water temperature or to the temperature of the river water the day cooling started, whichever temperature is attained first. Cooling is started just as soon as the lift is started, and water must be circulating through all coils when concrete is placed over them. By this early starting of the cooling process, it has been possible to dissipate the heat of hydration so that the maximum rise has been not over 20 degrees.

Absorptive Form Lining

Absorptive lining is being used on the forms for all exposed faces, including the spillway. This is reported to do away with air bubble holes, water holes and sand streaking on the surface of the concrete, and also produces a very hard surface which is particularly desirable on the spillway. The material used is Celotex, a special type board painted on one side with an asphaltic coat, which comes 4 feet wide and 1/2 inch thick and is sawed and fitted on the job.

The use of this material is slightly more expensive, principally because of the greater amount of labor involved. The lining is nailed onto the forms with 4-penny casing nails, using about one to the square foot in the body of the panel and about 3 inches apart in a row around the edges. The lining can not be used a second time but is removed and the nails pulled after each pour. The effect on the surface of the concrete is that of case hardening, the surface being not only smooth and free from holes but actually harder than the body of the concrete. This lining was experimented with at Grand Coulee in a small way, but this is the first big job on which it has been used.

For inside surfaces, cantilever-type forms are used, metal-lined. The construction of these forms is much heavier than usual, 10 x 14-inch timbers being used for the vertical wales. Form jacks at the bottom, pressing against finished concrete, provide for vertical alignment.

No Gold in This Dam

Some distance downstream from where the gravel is being procured, Uncle Sam and the contractors are carrying on a small gold recovery operation, sharing 50-50. All materials are passed over riffles, the contractors furnishing the equipment and extracting the

gold, and the government taking half because in this case it owns the deposit outright and is not simply leasing the gravel rights. The amount of the precious metal is not much, they say, and will probably be no more than \$100,000 or \$125,000, all told.

At any rate, Friant Dam when completed will contain some pumicite but will be practically without gold content. Without this recovery system, the dam might have contained several cents worth of gold per cubic yard, "book value" of course.

Personnel

Friant Dam is a feature of the Central Valley Project of the Bureau of Reclamation, for which R. B. Williams is Construction Engineer at Friant Dam. For the contractors, Griffith Co. & Bent Co., H. Stanley Bent serves as Project Manager and M. H. Slocum, General Superintendent.

Do your share for National Defense.
Buy Defense Bonds and Stamps.

Sling and Crane Chains Described in Catalog

The S. G. Taylor Chain Co., Hammond, Ind., has recently issued a new series of bulletins, bound in catalog form, which illustrate and describe many types and grades of chain made by this company. One section is devoted to sling and crane chains, and the other features BBB coil chain, electric-welded

steel loading chain, Taylor-made coil and machine chain, chain for hoists, etc. Of interest to engineers, maintenance men and other chain users is the data relating to "proof tests", chain terminology, and tables illustrating safe loads for chains and slings for different variations in the angle of the load.

A copy of this catalog may be obtained by writing to the manufacturer and mentioning this item.

The New KEYLODE Contraction Joint—



Highlights of this new joint:

1. A rigid, fully assembled unit for transverse contraction joints, ready to be applied to subgrade. (No dowel bars required.)
2. The heavy plate shoes with arm braces insure uniform installation alignment of dowel plate.
3. The concrete slab edges are interlocked above and below the 13-gauge key-plate to transfer heavy traffic loads.
4. Economy in initial cost and lower installation cost mean a substantial saving over present dummy-joint methods.
5. The KEYLODE contraction joint, with 13-gauge plate dowel, also acts as a seal, and with the 20-gauge dividing plate held 1/8" below top of slab, eliminates the necessity of edging and filling top of joint.
6. KEYLODE contraction joints are furnished crowned or straight, as may be specified, and are shipped painted and greased. (To break bond.)

Friess
HIGHWAY STEEL
PRODUCTS
COMPANY
Chicago Heights, Illinois

Concerning THE AVAILABILITY AND QUALITY OF DODGE Job-Rated TRUCKS

THE FIRST obligation of Dodge today is to contribute to national defense. Our contribution, at present, is two-fold: In our extensive plants, Dodge is producing important national defense units, including thousands of Army trucks. Also, Dodge is building trucks for the transportation of vital commodities—the movement of which is the essence of complete national defense!

On the broad shoulders of America's great trucking industry lies the responsibility of moving largely increased quantities of materials . . . efficiently, dependably, safely and at lowest cost. The trucking industry's willingness and ability to do this job is beyond question. It becomes a matter of the availability and the quality of trucks. The need is for trucks that are built for the job . . . to stay on the job . . . Job-Rated trucks!

Today, we are building more trucks than ever before in our history: trucks for the Army;

trucks for industrial defense hauling! They're good trucks . . . the best we've ever built! Best design, best materials, best workmanship, best quality throughout.

Now, we also announce more powerful trucks . . . much more powerful than ever before. We're building these higher-powered trucks today . . . shipping them to our dealers. And we'll continue to do our utmost to get trucks to you . . . quickly . . . as you need them.

Defense needs the trucking industry. The trucking industry needs trucks. Dodge is providing the best trucks that men, materials and machines can create, Job-Rated trucks of the same high standard of excellence that has won for Dodge its traditional reputation for Dependability.

H. J. O'Hair
President, Dodge Division,
Chrysler Corporation

There can be no curtailment of Dodge Quality
... no substitute for DODGE DEPENDABILITY





C. & E. M. Photo

Loading shale to a Euclid with a 1½-yard Marion shovel on the Guthrie job.

Grading Mostly Rock On U.S.-Penna. Route

(Continued from page 27)

the fill with these outfits were a D8 equipped with an Angledozer, a D8 with a LeTourneau roter and a D4 with a LeTourneau bulldozer. A Buffalo-Springfield 10-ton roller compacted the 4-inch specified layers of earth.

Making the Fills

Pennsylvania State Highway specifications require 1½ to 1 slopes for both rock and earth fills and a minimum of 8 inches of earth to top out all rock fills. No earth needs to be placed on the sides of the fills; in fact this is discouraged as it is felt that there is better opportunity for drainage when the sides of the rock fills are left open. Rock goes into the fills in 12-inch layers and dirt in 4-inch layers, except where fills will remain unpaved for two months or over the winter. Then rock fills are placed in 2-foot layers and earth fills in 8-inch layers. All rock and earth fills were rolled in the specified layers with Buffalo-Springfield 10-ton 3-wheel rollers, a Huber 10-ton roller, and a Hercules roller.

On rock fills a P & H ¾-yard crane with a skullcracker and a Bucyrus-Erie 19-B crane with another skullcracker reduced oversize rock to less than 12 inches in its largest diameter and in doing this produced smaller stone for

filling in around the maximum-size rock allowed in the fills. Several men were employed on each rock fill to hand-sledge similar rock along the edge of the fills. A 1¼-yard Speedcrane was used for trench excavation for pipe and for structure excavation for walls and culvert headwalls.

To furnish adequate lights for night work, eight Kohler 1,500-watt electric plants, mounted on log skids with 20-foot saplings carrying large floodlights, were distributed over the job and covered the area being worked most effectively.

Rock Slopes

All rock cut slopes, many of which ran as much as 100 feet high in side-hill cuts, were trimmed to 1½ to 1 or 1½ to 1, depending on the character of the material. Because traffic used the first 2¾ miles of this highway continuously throughout the grading in the summer and autumn of 1940, it was necessary to keep these rock slopes clean and prevent any rock from slipping and endangering traffic. A crew of about six men was kept on the slopes, removing all loose material. To expedite their work and prevent the possibility of their slipping and falling, safety ropes were strung down the face of the slopes. A flagman equipped with a whistle remained on the road and whenever traffic was passing he warned the men on the slopes above to stop working long enough to permit traffic to pass and thus reduce the possible hazard to motor vehicles and passengers.

(Concluded on next page)

New Handy-Size Catalog on "The Jack That Joyce Built"

A new handy-size catalog of Joyce jacks has just been issued by the Joyce-Cridland Co., Dayton, Ohio. In 36 pages it illustrates and describes with complete specifications 289 different models and sizes of jacks ranging from 1½ to 100-tons lifting capacity. The Joyce line includes a wide range of ratchet lever, screw, and hydraulic jacks, as well as many special-purpose products such as trench braces, bench screws, traversing bases, and lifts for handling heavy materials and servicing automobiles and trucks.

Copies of this Catalog No. 300 may be obtained by writing direct to the manufacturer and mentioning this item.

New Linn Export Manager

J. M. Homs, with offices at 44 Whitehall Street, New York City, has been appointed Export Manager for the Linn Mfg. Corp., Morris, N. Y. It is believed

that the Linn Haftrak, with its flexible contour, following traction, and 10 to 50-ton capacity, has a large potential market in Central and South America.

The additional new Linn Model C-5 which combines the features of a fast 4-wheel truck with Haftrak traction as desired by the operator, according to whether roads or countryside are to be traversed, is believed to be particularly adapted to the export field.

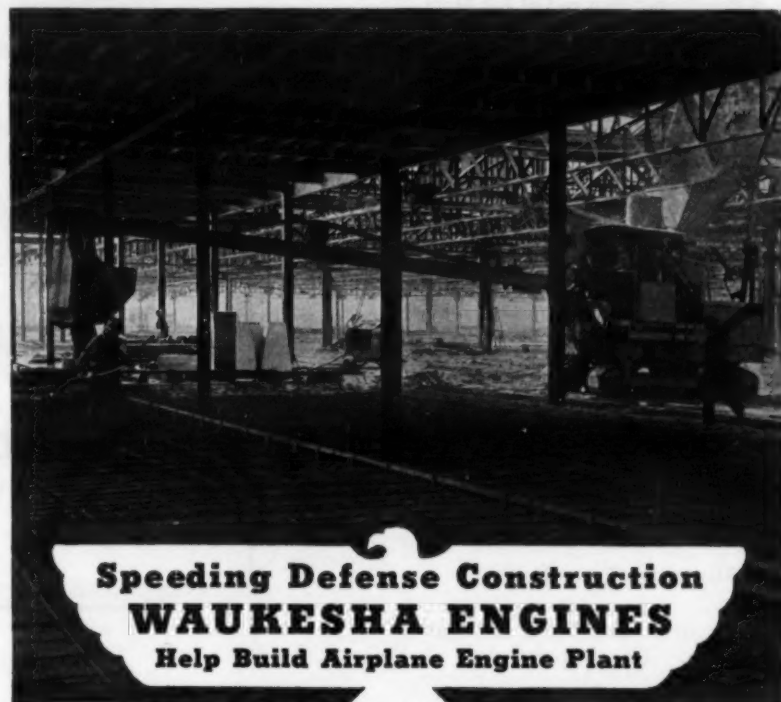
TARPAULINS ROAD MATS WINDBREAKS

CONTRACTORS' SUPPLY DEALERS in every state sell the Fulton line. Specify SHURE-DRY and FULTEX Tents, Tarps, and Windbreaks—anything made of canvas. Also Fulton Road Mats and Burlap. Fulton products are good and prices are right. If your dealer can't supply you write our nearest plant for catalog, samples and price list.

write for prices

Fulton Bag & Cotton Mills

Manufacturers Since 1872
ATLANTA ST. LOUIS DALLAS
MINNEAPOLIS NEW YORK NEW ORLEANS KANSAS CITY SAN



Speeding Defense Construction WAUKESHA ENGINES Help Build Airplane Engine Plant

★ Waukesha power helps to speed defense construction of this new Buick Aircraft Corporation plant at Chicago. A Waukesha SRKR 100-125 hp. gasoline engine does its bit and drives the Koehring 27E paver, which spreads the concrete for the floor.

All over the country—wherever industrial production facilities are being built, modernized or expanded—Waukesha is on the job. Where army or navy air bases, supply depots, barracks, hospitals, water supply systems, sewers, docks and ship yards are being built, Waukesha Engines power air compressors, lighting generators, crushers, shovels,

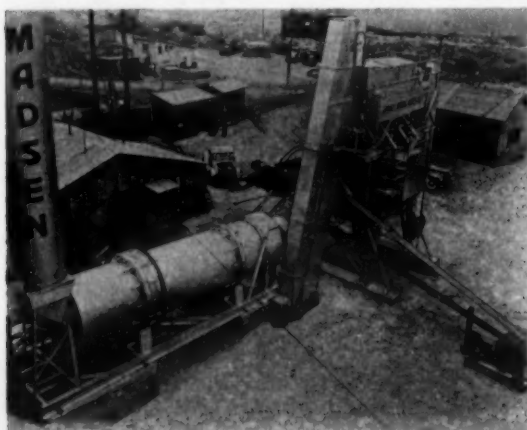
mixers, pavers, graders . . .

Powering not only contractors' construction machinery, but the machinery that builds the nation's roads...powering the trucks that roll along over them carrying equipment, materials and men.

Waukesha Gasoline and Oil Engines for Industrial, Stationary and Automotive Power range in size from 5 hp. to over 300 hp.

Bulletin 1079 is a complete catalog of every Waukesha Engine and Power Unit with ratings, speed, torque, horsepower and size . . . send for it today.

WAUKESHA MOTOR COMPANY
WAUKESHA, WISCONSIN
NEW YORK TULSA LOS ANGELES



MADSEN Asphalt Plant

3000-lb. capacity
72"x24' dryer

The plant complete, including the hot stone elevator, Symons vibrating screen, dust elevator, dust screw, 3000-lb. twin-shaft pug mill mixer and asphalt gun, is driven by a 75-hp. motor. A 30-hp. motor drives the dryer.

Step Up on Production—Step Down on Maintenance!

MADSEN Asphalt Plant Equipment, always a leader and recently greatly improved in design by MADSEN Engineers, will enable you to step up your production and cut down your costs.

MADSEN's far simpler transmission arrangement handles from a single power source, if desired, the driving of all the component parts of the plant; this function being accomplished with fewer chain drives, fewer sprockets, fewer gears and less footage of line-shafting than any other plant built with a single power input.

Simplicity and sturdiness—these are the

reasons why, ton for ton, MADSEN asphalt plant maintenance is lower than that of other makes.

MADSEN mixers have heavier wearing sections—built of superior materials and designed to take the wear where it is most severely imposed.

The new MADSEN asphalt gun is the greatest improvement in asphalt equipment in twenty years.

MADSEN plants are built in sizes ranging from 500 pounds to 6000 pounds per batch, assuring every contractor of suitable equipment for his own special production requirements.

MADSEN IRON WORKS, 5631 Bickel St., Huntington Park, Calif.



C. & E. M. Photo
Putting lubricant into an oil reservoir
on an air line from a manifold feeding
four jackhammers.

Penna. Grading Job Pushed Through Fast

(Continued from preceding page)

Concrete Plant for Bridge Work

In order to expedite the construction of the single bridge on the job, the contractor erected his aggregate and cement batching plants early in the grading operations so that they would be ready to furnish weighed batches for the bridge concrete and then would remain for paving operations. The batching plant consisted of a 170-ton 3-compartment Blaw-Knox weighing aggregate batcher and a Blaw-Knox bulk-cement silo. Aggregates were handled from stockpiles by a Bucyrus-Erie 37-B crane and a fleet of five 2-batch trucks was used to haul the dry batches to a 27-E Koehring paver which mixed the concrete close by the bridge. It was picked up in a 1-yard bottom-dump bucket by a Bucyrus-Erie E-2 crane with a 50-foot boom, and swung to place.

All backfill close to the bridge structure and around all culverts was consolidated with a pneumatic tamper where rolling equipment could not operate satisfactorily.

Warehouse and Shop

An unusually well-built and effective warehouse and shop, measuring 40 x 80 feet, was erected by the contractor at about the middle of the job just off the right-of-way. This wooden building contained an office for the Master

Mechanic and a parts room where small tools were also stored. This section of the structure was sheathed with roofing paper for added protection, then adjacent to it, continuing the same roof, were two stalls open at both ends for the repair of trucks, and at the far end the machine shop. Both stalls had concrete floors and one of them contained a pit to speed up work beneath the heavy equipment. Mechanics' benches between the two stalls and against the machine shop expedited the work of the mechanics and six lights in each stall made night work less difficult.

In the machine shop was a General Electric welder, an Airco acetylene welding outfit, a section curtained off for welding operations to protect the eyes of mechanics working nearby, a complete blacksmith shop, a pair of power-driven grinders, and a Canedy Otto drill press. At the far end, just outside the machine shop, a Kohler electric plant of 5,000-watts capacity furnished light and power for the warehouse, office, repair stalls and shop.

Personnel

The contract for the 7.17 miles of 33 and 44-foot reinforced-concrete pavement, with preliminary grading, was awarded to A. Guthrie & Co., Inc. of St. Paul, Minn. on its low bid of \$933,113.70. The job was run under the direction of J. J. Donovan, Superintendent, with Ivar Lindstrom as Master Mechanic. For the Pennsylvania Department of Highways, H. E. White was Resident Engineer.

Land-Clearing Tools

A new booklet on land clearing has recently been issued by the LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa, demonstrating the use of its line of interchangeable land-clearing tools, the root cutter, brush cutter, tree-dozer, brush rake and stump splitter, with Caterpillar tractors. Land clearing projects, such as highways, reservoirs, airports, etc., are also described and illustrated, with information on methods and equipment used.

Copies of this booklet, Form No. A-114-640, may be obtained by writing direct to the manufacturer and mentioning this item.

WON'T QUIT
or cause time out



A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company

32-36 Dry Street
New York, N.Y.

Hayward Buckets

Calcium Chloride

Used In The Mix To Speed Up and Protect Winter Construction of Sewage Plant

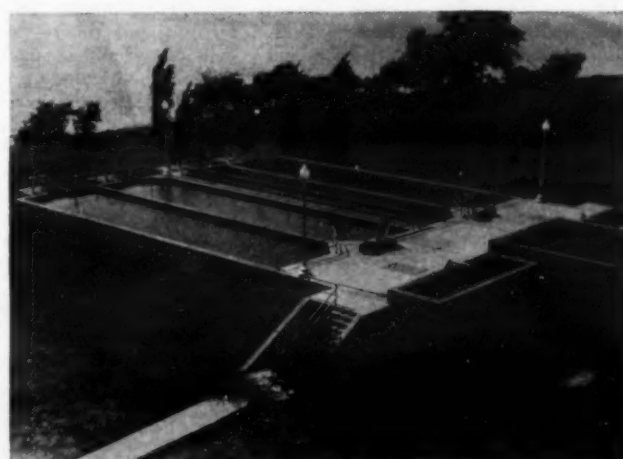
During winter construction of this most modern sewage disposal plant at Washington, D. C., specifications required the use of calcium chloride whenever temperatures were expected to reach 50° Fahrenheit or lower.

Research shows that concrete containing calcium chloride placed at air temperatures 44-48° acquired necessary stiffness for finishing in almost exactly the same time as plain concrete placed at ideal air temperature 70°. The addition of calcium chloride thus makes up for the lag in setting time which occurs when plain concrete is placed in cold weather. This acceleration of set shortens the time when cold weather protection and covering are necessary.

Concrete containing calcium chloride had 675 lbs. transverse strength at 3 days as against 415 lbs. for plain concrete—a gain of 63% in strength through use of calcium chloride. This high early strength gets concrete out of danger quickly.

Write for bulletins covering the use of calcium chloride in cold weather concreting and where speed and quality are important.

CALCIUM CHLORIDE ASSOCIATION
4145 PENOBSCOT BLDG. • DETROIT, MICHIGAN



AIRPORT

Runways

Aprons

Paving

**MUST BE PROPERLY
REINFORCED**

**Design Data and Complete
Steel Service**

Write for
this
Bulletin
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Direct Your
Inquiries to



LACLEDE STEEL COMPANY
ST. LOUIS, MO.

CALCIUM CHLORIDE
YEAR 'ROUND CONCRETE CONSTRUCTION

Speedy Paving On New Jersey Highway

(Continued from page 19)

The batches as weighed out on this job were as follows:

	Pounds
No. 1 gravel (1/4-inch).....	1,135
No. 2 gravel (3/8-inch).....	1,702
Sand.....	1,123
Cement.....	753
Total weight of batch.....	4,713

Forms to Finishing

To keep pace with the speed of the paver, this contractor used 14 men on form trench, including the boss form setter and helpers who kept a long line of Heltzel, Blaw-Knox and Metaforms set ahead for the 9-inch uniform slab. As soon as the forms were set, a novel subgrade cutter was pulled over the forms by one of the power graders. This unit has teeth at the front to remove stones from the grade which would make the final finishing and rolling difficult, and then behind it is the cutter blade to give the exact line of the subgrade. Two levers on top of the machine raise either the teeth or the blade should they become overloaded while being pulled forward. When this machine had cut the grade to a true line, four men making up the fine grade crew used a template to check the grade and then the expansion joints were set at intervals of 56 feet 4 inches. One man set the clamps for the expansion joints, followed by another man who assembled them completely.

This operation was immediately followed by setting the initial flashing for the 1/4-inch thick waterproofing mastic against the form which was placed on the inside where the second lane of concrete would be poured. The initial flashing contains the upright portion of the waterproof joint into which the second one was inserted when the second slab was poured. This initial flashing was set by one man using clamps inserted through drilled holes in the forms. A hammer was all that was needed to set the clamp tightly against the top of the form to hold the flashing firmly. A hand roller was used between the expansion joints to iron out foot marks and other irregularities. During this time the forms were oiled and just ahead of pouring the subgrade was sprinkled.

Because of the number of times which the new paving crosses from one side of



C. & E. M. Photo

The second pass with the B-K gas-electric finisher on Canuso & Sons' paving contract.

the road to the other, the contractor elected to do away with the conventional water line and employed two trucks carrying 1,000-gallon tanks each with a Jaeger Sure-Prime pump which delivered water direct to the paver tank. The man who spotted the trucks and dumped the batches also released the latch on the cement container so that it would rotate on its shaft and deliver the cement with the aggregate. The Koehring 34-E dual drum paver, with a 35-foot trussed boom, set the pace for the entire operation. During the four days preceding the 3-day Memorial Day week-end the job was operated 10 hours a day, producing 33 slabs each day with the 1-minute 55-second mixing time required for each batch. The job was normally operated 8 hours a day when the production averaged 27 slabs of 56 feet 4 inches each. On this contract the 10-foot slabs are crowned 1 1/4 inch from the center to the side so that water is not concentrated at one side of the 2-lane roadway.

Only two pit men were required with the dual spreader-gate bucket of the paver. The initial strike-off was done with a Blaw-Knox gas-electric finisher equipped with hydraulic lift for the two screeds. Following the first pass of the finishing machine two men with a 4 x 6, with plow handles, packed the concrete 2 inches below the top of the forms and placed the welded bar mats of 3/8-inch steel. At the corners of all slabs, that is, on both sides of each expansion joint, U-bars 10 feet long of 3/4-inch deformed bars, turned down 4 inches at the ends, were pressed into the concrete on the bar mats. All joints were vibrated on both sides and the concrete against the

forms similarly vibrated with a Viber machine.

After the second pass of the Blaw-Knox double-screed finisher a Koehring longitudinal finisher was used, followed by three hand finishers. These men used

(Concluded on next page)

New 2-Wheel Trailer For Arc Welding Units

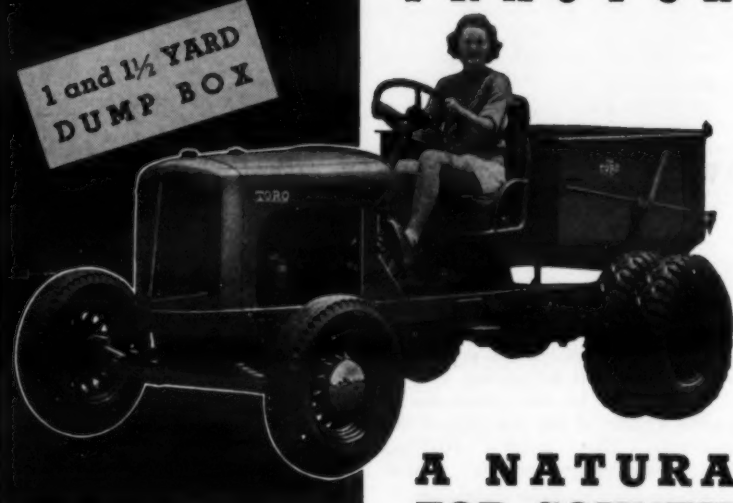
A new 2-wheel light-weight pneumatic-tired trailer for mounting arc-welding machines for easy fast portability in the shop or yard, on the road or in the field, has recently been announced by the Lincoln Electric Co., Cleveland, Ohio. Designed for mounting either Lincoln SAE 200 to 600-ampere a-c motor-driven or Type SA 200 special engine-driven arc welders, this new unit can be used for road towing up to approximately 30 miles an hour, and is easily moved about the shop or job by hand.

Mounting is readily accomplished by means of four bolts in the frame of the trailer which register with holes in lugs on the welding machine. The combination tow bar and standing support has a hand-ratchet arrangement for locking the supporting arm in position. The unit measures 66 inches long, 42 inches wide, 16 inches high over the 16 x 5.50 4-ply tires, and is of arc-welded steel construction throughout.

THE NEW TORO

GENERAL

DUMP BOX TRACTOR



A NATURAL FOR COUNTIES

You progressive County Superintendents, who are on the lookout for new improved methods, had better take a look at the new Toro GENERAL Dump Box Tractor.

It has ALL the features you want and need—an efficient 4 Cylinder Ford Engine, self starter, 4 Speed Transmission and a fool-proof 1 or 1 1/2 yard dump box.

You can move dirt, mow grass, cut weeds or plow snow with the GENERAL and the price is several hundred dollars less than the lowest price dump trucks.

CIRCULARS ARE READY—WRITE NOW!

TORO

MANUFACTURING CORPORATION

MOWING MACHINERY SPECIALISTS FOR OVER 20 YEARS

MINNEAPOLIS

MINNESOTA

MALL GASOLINE
POWERED
VIBRATORS
GET PRIORITY

**ON TOUGH
CONSTRUCTION
PROJECTS**

● When large volumes of concrete must be placed in complicated forms quickly, efficiently and economically, profit-minded contractors call for MALL 3 H. P. Gasoline-Powered Vibrators. They know from experience that these units will place low water-cement-ratio concrete faster and better—will run all day on 1 1/4 to 2 gallons of gasoline and that the variable speed engine will also furnish ample driving power for Concrete Surfacing, Form Sanding, Sawing with Circular or Chain Saw, Grinding, Pumping, Drilling and Wire Brushing. The swivel-fitted attachments for each of these jobs can be changed in a jiffy—and all operated with the same low-cost power at a tremendous saving in overhead. Why run the risk of paying out in tough jobs—when this popular priced vibrator will save time, power, labor and material and operate 8 other tools at low cost. Try it on your next job at our expense—Write for details and full information.

MALL TOOL COMPANY
7743 SOUTH CHICAGO AVE.
CHICAGO, ILL.
Offices and Distributors in Principal Cities

New Jersey Route Made Dual Highway

(Continued from preceding page)

a 10-foot drag straight-edge, then they cut the edges, next cut the joints, then dragged a 36-inch x 12-foot piece of burlap over the surface, checked the surface with a 10-foot aluminum straight-edge, and then gave it the conventional broom finish, finally edging the sides. As soon as the sheen of water had left the surface it was sprayed uniformly with an Aeroil emulsion sprayer for curing.

Major Quantities

Roadway excavation, unclassified	137,760	cubic yards
Wet excavation	3,590	" "
Excavation subsurface structures, extra depth	500	" "
Ditch excavation	709	" "
Borrow excavation	25,085	" "
Subbase	33,291	" "
Gravel shoulders, 7 1/2 inches average thickness	67,480	square yards
Resurfaced gravel shoulders	8,908	" "
Topsoiling and seeding, Type A	146,370	" "
Topsoiling and seeding, Type B	53,309	" "
Sodding	17,764	" "
Cast-in-place white concrete vertical curb	5,715	linear feet
Cast-in-place white concrete sloping curb	92	" "
Precast reflecting concrete sloping curb	8,117	" "
Two-way precast reflecting concrete sloping curb	2,684	" "
Reflecting white concrete vertical curb	6,394	" "
Precast reflecting concrete curb	419	" "
Foundation for precast curb	3,418	" "
4-inch concrete sidewalk	216	square yards
5-inch bituminous concrete sidewalk	5,826	" "
Subgrade	90,986	" "
Concrete pavement surface, 9-inch thick, reinforced	76,725	" "
Bituminous-concrete pavement	448	tons
White concrete island pavement	89	square yards
Removal of existing concrete pavement	13,177	" "
18-inch reinforced concrete pipe	13,697	linear feet
24-inch " "	634	" "
30-inch " "	2,204	" "
36-inch " "	26	" "
48-inch " "	80	" "
18-inch cast iron culvert pipe, extra heavy	132	" "
24-inch cast iron culvert pipe, extra heavy	4,548	" "
30-inch cast iron culvert pipe, extra heavy	38	" "
12-inch corrugated metal pipe, bituminous-coated	22	" "
6-inch perforated corrugated metal pipe, bituminous-coated	134	linear feet
Underdrain	510	" "
Reset wire rope railing	1,500	" "
	2,682	" "

BRIDGE ITEMS

Foundation excavation	100	cubic yards
Concrete balustrade	22.5	linear feet
Class B concrete in structures	49	cubic yards
Class C concrete in structures	74	" "
Class D concrete in structures	54	" "
Reinforcement steel	6,700	pounds
Timber piles	1,334	linear feet

Personnel

The contract for widening 5.996 miles of New Jersey Route S41, Sections 3B and 4A in Camden County, was awarded to F. A. Canuso & Son, Inc. of Philadelphia, Pa., for whom Vito Canuso was Superintendent throughout the contract. The work was done under the direction of H. D. Robbins, District Engineer, New Jersey State Highway Department, with J. H. Gerecke as Resident Engineer.

Trans-Isthmian Road Nearing Completion

Under the blazing tropical sun by day and brilliant floodlights at night, a thousand men are working on defense-spurred schedules to complete by next spring the first highway across the Isthmus of Panama at the Canal Zone. The 50-mile highway will connect Colon on the Atlantic end of the Panama Canal with Panama City on the Pacific end and will serve about 200,000 people in the Isthmian area. It will be the first Trans-Isthmian route since the days of the gold trail in the seventeenth century.

The road under construction consists of two 10-foot lanes, of reinforced concrete 9 inches thick, separated by a 4-foot bituminous strip. An 8-foot shoulder on each side will bring the total roadway width to 40 feet. The present work is the result of a treaty with Panama proclaimed in 1939, under the terms of which the United States agreed to provide a corridor from the Panamanian city of Colon, formerly entirely surrounded by the Canal Zone, to the boundary of the Zone near Cativa, Panama, and to construct a highway through this corridor. The Republic of Panama in return agreed to provide a right-of-way to Alhajuela where Madden Dam bridges the Chagres River, connecting with the road from Alhajuela to Summit and the Pacific end of the Canal. Panama is building a 2-mile section of the

highway from Avenida Bolivar in Colon to a point near Fort Randolph road. Construction will continue from this point to the Canal Zone border near Cativa and on through Panamanian jungle to Madden Dam, a distance of 24.5 miles. At the Pacific end, the Trans-Isthmian road will intersect with the proposed Pan-American Highway from the United States to South America.

Under an agreement with the Republic of Panama, the construction now in progress is under the supervision of the Public Roads Administration of the U. S. Federal Works Agency. Panamanian workmen are used extensively for the unskilled labor in clearing and grubbing and similar work. Panamanian instrument men, chain men, rod men and machete men work with the engineering parties. The operators for the heavy power equipment, such as tractor-scraper units, power shovels, and similar machines, are from the United States, because of the need for men skilled in the use of this machinery.

The thousand men now employed on the engineering and construction of the Trans-Isthmian highway are housed in camps located at three points along the right-of-way. Electric lighting plants have been installed so that some of the work can be maintained on a 24-hour 6-day a week basis.

Conveying Equipment

A colorful illustrated bulletin entitled "The Labor Saver" has recently been issued by the Stephens-Adamson Mfg. Co., Aurora, Ill., presenting users' case studies on the S-A line of conveyors, elevators and transmission equipment. Copies of this bulletin, Volume 187, may be obtained from the manufacturer.

Self-Feeding Spreader Operated from Truck Cab

One of the features of the Flinks self-feeding material spreader is the fact that it is entirely fed and operated from the truck cab, eliminating the need for a spreader operator. Built to fit all standard 5 1/2 and 6-foot truck bodies, these spreaders will handle sand, chips, chlorides, cinders, or aggregates for all types of road construction or maintenance jobs.

A 4-page folder describing and illustrating this and other features of the Flinks spreader may be secured by interested contractors and state, county and town highway engineers direct from the Flink Implement Co., Streator, Ill., by referring to this item.

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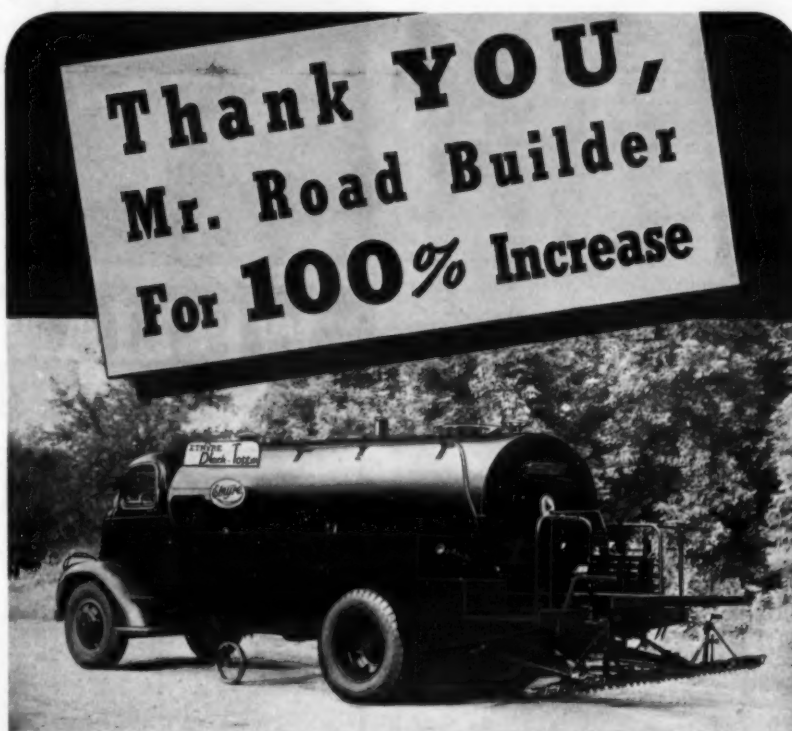
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BLACK TOPPER

BITUMINOUS DISTRIBUTORS

Indiana's Experience With Black-Top Roads

A Study of Results Shows Importance of Subgrade And Drainage; Both Needed For Satisfactory Surface

By BEN H. PETTY, Professor of Highway Engineering, Purdue University

IN the field of highway engineering, the general term "black top" covers a multitude of both sins and blessings. To the average motorist, however, any black-surfaced road is a black top, regardless of the fact that they may range all the way from a cheap oil surface to an expensive high-type surface, such as sheet asphalt, rock asphalt, or asphaltic concrete. This one-type grouping of all bituminous surfaces in the layman's mind has caused many headaches among both highway officials and producers of these materials. When a cheap oiled surface or low-cost mixed-in-place bituminous surface goes bad in a relatively short time, the traveling public is likely to issue a blanket condemnation of all black tops, which of course is very unfair to bituminous roads in general.

Materials Not Responsible

Many bituminous road failures should not be charged against the materials used, but rather against the engineers or officials who failed to make the necessary preparations to insure the full economical life of the bituminous wearing surface. For example, when the pressure from people living along a dusty unstabilized gravel road becomes too great, we are likely to rush out and slap down a thin mixed-in-place bituminous surface to eliminate the dust nuisance, with no advance preparations whatever. In the following spring, when the frost goes out of the ground and the black-top surface has "gone with the winter," the road officials wonder what happened and the taxpayers begin to question the value of all black-top roads.

My advice to county road men is to wait at least one year after they have decided to black-top a gravel or stone road before actually doing so. In the meantime, they can dig some test holes through the road metal at sufficiently close intervals to check its thickness, and then have ample time to add additional gravel or stone where needed to be maintained and consolidated through the autumn and winter seasons.

We used to think that 6 inches of compacted gravel or stone was sufficient to carry a black top, but the tendency now is to increase this thickness. Is the requirement of a 12-inch consolidated

stone or gravel base too much to ask to insure a reasonable life for the bituminous wearing surface? After all, most failures in bituminous pavements have been base failures, and to insure satisfactory results from a black-top surface, we must guarantee an adequate load-carrying foundation.

Also, during this interim, adequate drainage facilities should be provided and shoulders should be widened to at least 8 feet and preferably 10 feet, to permit the passage of farm tractors entirely off the proposed black-top surface.

Placing Bituminous Material

Another thing we have learned to our sorrow in Indiana is that you can not place bituminous surfaces satisfactorily in cool or wet weather. Too many times, due to various circumstances, this type of work has been started late in the road-building season and carried on into the autumn months when the temperature was low and possibly the rainy season had begun. As a result, the compaction of the bituminous layer is inadequate, the density is low, and the entrance of water, followed by freezing, causes serious disintegration and raveling. This work should be done during hot weather, with September 1 as a reasonable deadline in climates similar to that in Indiana.

If the work is done early enough in the summer, it will insure several succeeding weeks of hot weather during which traffic will further consolidate the surface and the high temperatures will tend to provide a better seal for the black top. On oil-mat surfaces this high temperature will cause considerable bleeding, which is not altogether objectionable as it aids the process of sealing up the surface. If prompt attention is given to spreading a thin coating of No. 12 gravel or stone chips on these bleeding sections, it will tend to seal and build up the surface, thus providing a better road. Oil mats frequently bleed the second or third year after placing and require additional applications of fine chips to absorb the surplus oil.

Where a medium-grade road oil, tar, cut-back or emulsified asphalt is used in a mixed-in-place operation on a stone or gravel road, this should be rolled and opened to traffic three or four weeks before sealing with a heavy bituminous material. In fact, some of the Indiana counties do not put on the seal coat until the following year. In the meantime, weaknesses in the road develop and can be patched before the seal coat is applied. If this mixture is sealed up promptly, practically all evaporation is

cut off, thus preventing elimination of the volatile constituents, and the road under traffic is liable to develop a corrugated surface.

We had a case where county officials were very much disturbed over the fact that one of their black-top roads had developed a badly corrugated surface within a year. Questioning brought out the fact that the seal coat had been put on immediately after the mixing operations had been completed and the material spread out and rolled. We suggested that they dig into a few of the humps in the road and in each case this disclosed that immediately below the hard solid seal coat was a layer of from 1 to 2 inches of aggregate and soft bituminous material which had never dried and set properly. Unless most of these volatile constituents leave the bituminous material, the mixture may stay soft and plastic for a long period of time.

Type of Aggregate

After many years of argument, we

have discovered that better results are obtained through the use of fine graded cover stone in the seal coat operation. In the old days chips or pea gravel running up to $\frac{3}{4}$ -inch maximum size were used, to obtain a more non-skid surface. The finer aggregate naturally sifted to the bottom. In the autumn water entered the voids between the coarser pieces of aggregate and on freezing would expand, thus kicking the pebbles loose on the surface, causing serious raveling. The tendency now is to use No. 11 or preferably No. 12 aggregate in the sealing operations, thus insuring a tighter, more waterproof surface which will have a sand-paper non-skid surface if there is no surplus of bituminous material. Exhaustive tests conducted by Professor Moyer of Iowa State College have proved that the fine aggregate surfaces are in general more non-skid than coarse-aggregate surfaces. For example, sandstone rock asphalt, which has a very fine aggregate exposed on the surface, in most cases proved more non-skid than

(Concluded on page 41)

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Roadside Planting Cuts Kentucky Costs

(Continued from page 20)

parallel the roadway on either side of the pavement in a straight line. American elms are spaced every 100 feet in the background, with Scotch pines between them. Also between and in front of these trees are dogwood and redbuds, both plants native to Kentucky, and other blooming shrubs. The project is so arranged that there is a bloom of some description every season of the year, and it contains 1,100 shrubs, 150 American elms and 120 Scotch pines.

Remaining Projects

Projects 7 to 13 are small and scattered along the road, the outstanding one being Project 9 consisting of a through cut of a long row of pin oaks and at another a long line of Norway maple trees. Shrubs and evergreens were also used on these projects.

Project 13, known as McCool's Creek, is a complete planting of a through cut approximately 500 feet in length, the cut running from nothing on either end to a maximum of approximately 15 feet in the center. The background of this planting consists of Scotch pines, white pines, red cedars, and black hill spruce. The face of the cut is planted with holly trees, dogwood, American and European Euonymus, flowering plum, dwarf Japanese flowering quince, spirea froebelii, flowering crab apple, and redbuds. The plants on the face of the cut were planted with a small retaining wall placed in front of each, which adds to the attractiveness of the project as well as protecting the bank and the shrubs from being washed away.

Project 14 and 15 comprise one long outlay bordering a 30-foot highway between Ghent and Carrollton and are similar to the Model Mile. The background is canoe-bark birch with Canadian hemlock between and wherever it could be arranged Juniper Phitz, a low-type spreading evergreen, was placed. The rest of the planting is composed of different types of spirea, redbuds and dogwood, several types of virburnum, and two types of hydrangia, so that some of the plants are in bloom each season of the year. In this stretch of planting there were several unsightly borrow pits as a result of the construction of the road. These were smoothed out and planted with swamp oaks and weeping willow.

Project 16 is a Y just west of Carrollton on U. S. 42. Because of the sight distance, we had to use low-growing plants on this section, and selected Juniper Phitz, Juniper Prostrata, and red leaf barberry. The ground was sodded with a heavy blue grass and the plants arranged on beds of various shapes.

Project No. 17 is also a Y, approximately 3 miles west of Sligo, and is arranged similarly to Project 16, with



A number of trees with roots exposed were saved by constructing cribbing around the tree and backfilling with earth, as illustrated by these "before and after" photos.

Mugho pines and red-leaf barberry planted in beds.

We feel that our roadside planting has been very successful, and the loss of plants has been very small, not more than 10 per cent of our entire planting having failed. This is attributed to several reasons, the most important of which is that all plants purchased from the various nurseries were carefully inspected and only first-class plants were used. The first year all plants were watered regularly, special attention was given to them throughout the summer months, and they were also sprayed regularly. The planting was planned by a landscape architect and special attention was given to the spacing of all plants. Also we found peat moss to be most beneficial and used about 75 bales in our original planting. This preserves the moisture; and in addition a little peat moss mixed with the earth around the plants gives a better appearance. We have found that after five years of use, the peat moss is still effective.

Even with careful planting and spacing, plants became crowded and we have transplanted more than 1,800 plants, without affecting the appearance of the roadside.

In addition to the various projects already described, we have miles of honeysuckle planted along the steep banks of our roads. This eliminates gully washing and keeps the ditches from filling up. This one planting item alone saves the cost of the entire outlay by preventing slipping cuts.

Other Roadside Work

Our planting on U. S. 42 extends from Covington to the Jefferson County line, a distance of about 85 miles. The projects already described comprise most of our roadside development; however we have constructed some rock gardens, roadside parks which contain rustic fireplaces, seats and tables, and have drilled artesian wells to provide fresh drinking water for visitors.

All along the highway a number of beautiful trees whose roots were half exposed, due to new road construction, have been saved. This was done by cribbing or riprapping around the roots to form a protection for them and then backfilling with earth.

Costs and Results

The actual cost of all plants, trees and shrubs in our original planting was only between \$7,000 and \$8,000. How-

ever, since that time various contracts have been awarded under Federal Aid amounting to several times the original outlay. The Department of Highways crew consists of a foreman and an average of six men who maintain the entire project.

As an actual maintenance saving, we never have to do any heavy ditching or slope grading, as the trees and shrubs eliminate the necessity of this. We also have a good stand of grass at the various projects, eliminating all washing and ditch filling. We estimate that our honeysuckle alone will save more than the cost of the ditching which would have been required if the planting had not been done. In addition, thousands of out-of-state cars pass over this high-

way to visit this sight, spending enough in gasoline to pay for the entire outlay.

Waterproof Clothing

The Goodall Rubber Co., manufacturer of industrial rubber products, has recently released its new catalog covering safety, sporting and regular boots, service coats and work suits, rubber and oiled clothing, aprons, hats, rubber blankets and gloves. In all, 150 styles are described and 54 are illustrated.

Copies of this attractive catalog, which is bound in silver Metaloid, may be obtained by writing direct to the Goodall Rubber Co., 2 S. 36th St., Philadelphia, Penna., and mentioning this item.

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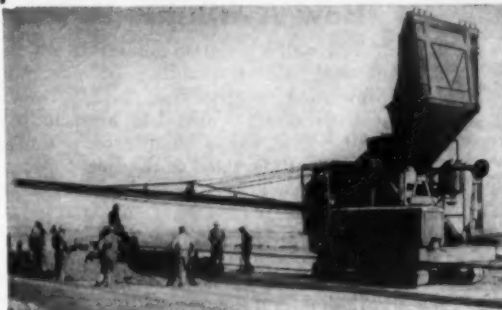
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TELLING THE PUBLIC



C. E. M. Photo.

More and more contractors are using signs such as this on their jobs to educate the public to the value of construction by contract. To such signs might well be added some information about the job itself, for only by making the public aware of the efficiency and economy of the contract system can that system be preserved.

Line of Dump Bodies Has New Super Hoist

Because of the success of the Super Hydraulic Hoist used in some of the models in its line, the Anthony Co., Inc., Streator, Ill., announces that now its complete line of hydraulic-hoist dump bodies, in capacities from 5 to 30 tons, will be of the Super double-arm design. This means that the entire line, from smallest to largest and including single and twin-cylinder models, will have the power-speed feature of the Super Hoist. Also, through the use of the balanced piston type of control valve, the entire line will be equipped with the latest "push-pull" dash control.

This patented hoist design permits the exclusive use of the rubber restraining blocks which replace the former restraining chains and springs. Other features of the Super Hoist design are telescopic tipping; subframe for lower mounting and greater load and truck stability; and unit construction making the entire dump unit independent of the truck chassis and using the chassis only to carry the load.

Further details and catalogs describing the line of Anthony Super hydraulic hoists may be secured by those interested direct from the manufacturer by referring to CONTRACTORS AND ENGINEERS MONTHLY.

"In the Groove"

In a recent issue of *The Co-operator*, published by R. G. LeTourneau, Inc., there was an interesting and helpful discussion of the care of cable on cable-operated equipment, such as Carryall scrapers, 'Dozers, and similar units, by Ray Gieszl, LeTourneau General Service Manager.

This article points out that such equipment is designed for a certain type and size of cable. On LeTourneau units, independent wire-rope-center 6 x 19 pre-formed improved-plow-steel right-langle cable is used. Experience has shown that cable meeting these specifications pays off in considerable extra wear. With the wire rope center, the cable can be lubricated and thus given a new lease on life. The extra-quality steel provides longer wear, while preformed cable has stresses removed and as a result runs straight and eliminates the extra wear of rotating cable.

Always use the size of rope specified for your particular piece of equipment. Each sheave is grooved and designed in diameter for a certain size of cable, and

any but the right gage will result in either pinched or flattened cable, both of which greatly increase cable cost. Cable that is too small will be over-strained and wear faster; over-sized cable will be clumsy, wasteful and hard on the equipment.

Keep the sheaves lined up straight. Side pull and running over the edge of the sheave reduces power and cuts through the cable. If the cable imprint shows in the sheave groove, replace the sheave. If not removed, the imprint will act as a grindstone on the cable, wearing it out quickly.

A cable chart for all LeTourneau machines has been prepared, to guide users of this equipment in the care of the cable. Copies of these charts may be secured direct from R. G. LeTourneau, Inc., Peoria, Ill., or Stockton, Calif.

Concrete Admixture Now Available in East

Tricosal, a concrete admixture for increasing the workability of concrete, preventing segregation, and provide waterproofing, which has been in use in the West for a number of years, is now being marketed in the East through the Eastern Tricosal Co., Inc., 101 Park Ave., New York City.

In composition Tricosal is a neutral liquid containing chemically modified protein derivatives which have marked colloidal and dispersing properties. It contains no fats or tars, is not sulphated and, it is stated, does not alter the basic process of setting and hardening the cement. It is claimed that it does, however, have a strong dispersing effect on the aggregate and promotes uniform, speedy and thorough hydration of the cement grains with a minimum of water.

Further information on Tricosal, which has been used in plain or waterproof concrete in foundations, tunnels, bridges, pillars, tanks, floors and buildings, in mortar and plaster, in concrete handled by Pumpcrete, and in Gunite work, is contained in literature which interested contractors and engineers may secure direct from the producer by mentioning this item.

New Impact Wrench

A new light-weight air-operated impact wrench, Size 504, has recently been announced by the Ingersoll-Rand Co., 11 Broadway, New York City. This tool, which weighs only 4 pounds, is reversible and can handle up to and including 3/8-inch bolt size nuts, is designed with the patented Pott impact wrench principle which localizes the steel-to-steel impact without transmitting shock to other parts of the tool, it is stated. A form-fitting pistol-grip handle, short overall length, and small nose diameter permits its operation in close quarters.

Form 2758, giving many interesting details about the impact wrench, may be secured direct from the manufacturer by mentioning this item.

Double Batch Pavers

The Koehring Co., 3026 W. Concordia Ave., Milwaukee, Wis., states that its new catalog on the Koehring Twin-

SAND'S-STEVEN'S Line & Surface LEVEL



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Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

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batch paver is more complete than any previous presentation of this 34-E machine. Featured is a triple pull-out spread illustrating the paver and a diagrammatic illustration on page 7 presenting the flow of the batch from the skip to the bucket. Construction features

are described in detail and the many photographs help present the contractor with a vivid picture of the paver and what it can do.

Copies of this catalog, No. K172, may be obtained by writing direct to the manufacturer and mentioning this item.

AMERICAN Safety-sized Pneumatic-tired WHEELBARROWS

You can help conserve steel and rubber for National defense by confining your wheelbarrow specifications to one of the SIX STANDARD NUMBERS in our NEW WHEELBARROW BULLETIN.

One of these six numbers will fit into your job, and give you long wear that will surprise you. Your American Safety-sized tires will last twice as long as ordinary pneumatic tires; and, as you know, pneumatic-tired barrows outlast ordinary steel-tired barrows many times!

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Some Do's and Don'ts For Black-Top Paving

(Continued from page 38)

any other bituminous types tested.

Another controversy has existed over the use of open-graded aggregate which provides a somewhat porous mixture as compared to close-graded aggregate which tends to produce a much greater density in the consolidated mixture. The trend now seems to be toward the use of the closer graded mixtures, aiming at as near maximum density as possible, to prevent the entrance of moisture, which always has a bad effect on bituminous materials.

Stabilization

A newer development which promises very satisfactory results is in the stabilization of a gravel or stone road to a depth of 4 to 6 inches, using a minimum quantity of bituminous materials, sometimes as low as 2 per cent. This tends to stabilize and more or less waterproof a greater thickness of road metal, which provides a more adequate base for a seal or armor coat. In this type of work, density is desirable and, where the aggregate is too coarse, additions of sand or soils have been made to insure greater density. This frequently requires the addition of water to provide adequate moisture content to facilitate greater compaction.

It is my belief that we are just on the verge of some rather startling developments in this particular field. Here again we are getting away from the old idea that the wearing surface is "the thing" and beginning to realize that the wearing surface is no better than the base on which it is founded. We can always repair the surface, but it is difficult to do anything about the base or the subgrade after the road has once been constructed. More extensive use of the soil profile information as a guide in correcting subgrade defects during original construction will pay handsome dividends.

In all of these considerations we must not overlook the importance of both surface and sub-drainage where the soil conditions are favorable. After all, one of the best forms of stabilization is adequate subgrade drainage.

Edge Raveling

One problem which causes road officials to become prematurely gray-haired is that of progressive raveling and disintegration along the edges of bituminous surfaces. In many cases the answer is that the bituminous surfaces are too narrow to carry two lanes of traffic without causing the wheels of passing motor vehicles to run off and on the bituminous edges at frequent intervals. This is particularly true on state highways where, through stage construction, we have salvaged an old gravel or stone road of about 16 to 18 feet in width and by successive applications of bituminous surfacings have developed an excellent road surface, so far as it goes, but it does not go far enough out from the center line. On roads of such widths, many passenger cars are

forced to run off the edge of the pavement surface in passing, and dual-tired rear wheels of motor trucks frequently cross the pavement edge. In many cases a truck will run for long distances with the outer wheel off the pavement, creating a dangerous gutter alongside.

Shoulder maintenance under such conditions is costly. It would be much more economical and desirable to trench out a sufficient width of shoulder adjacent to the pavement in which to construct an adequate base, and to extend the bituminous surfacing to a total width of 22 to 24 feet.

We have found in Indiana that edge raveling can be prevented or greatly reduced by setting the grader blade to trench out a wedge-shaped section along the edge so that when the mixture of aggregate and bituminous material is finally spread and rolled an edge thickness of from 2 to 4 inches greater than the thickness of the balance of the bituminous surface will be obtained.

Surface Patching

My "pet peeve" in connection with bituminous surfaces concerns the failure of many road men to patch road surfaces promptly and carefully wherever breaks occur. Huge sums could have been saved during the past few years on bituminous road surfaces had the road men gone out and patched these breaks just as soon as they developed. A bituminous surface is not a rigid surface. Under traffic, and aided and abetted by rainfall, a small break of a few square inches in area soon is pounded into a large hole. If such breaks are repaired promptly after forming, the expense of time and materials is small. But if this needed maintenance is postponed day after day, week

after week, and even month after month, when the road men finally get around to making repairs, the costs are terrific.

From a paper presented at the Illinois Road School March 6, 1941.

Unbreakable-Point Pencil For Draftsmen, Engineers

The feature of Templar DuroLead pencils is their special almost unbreakable point, upon which a pressure of nearly 10 pounds must be exerted in order to break it. It is stated that, by actual test, this pencil withstands a pressure of more than 250 times its own weight. The point is reinforced by using a patented lead and a special process of fusing the wood and the lead.

Made in six graded degrees of soft, medium soft, medium, firm, hard and very hard, in round or hexagonal shapes, these pencils are recommended for use in drafting rooms and engineers' offices, as well as in the field and for general use.

Free samples of these Templar DuroLead pencils for testing in actual use may be secured direct from the Reliance Pencil Corp., Mt. Vernon, N. Y., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

International Appoints Truck Branch Manager

Announcement has been made by the International Harvester Co. of the appointment of J. H. Kline as Manager of all International Truck Branches in Metropolitan New York, succeeding the late F. J. Harmon. Mr. Kline's headquarters are at 570 W. 42nd St., New York City.

Want information? Write the Editor.



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Heil Cable-Operated Scrapers are laying the groundwork on defense projects all over the country—and more and more successful defense contractors are switching to Heil Scrapers to get the increased yardage production and lower operating costs they offer.

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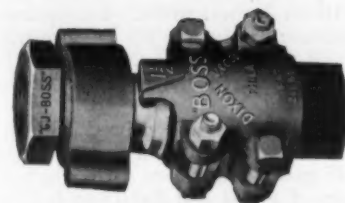


Left: This powerful Heil Hydraulic Bulldozer took the place of three other tractor units at Columbus, Ohio Garbage Disposal Plant.



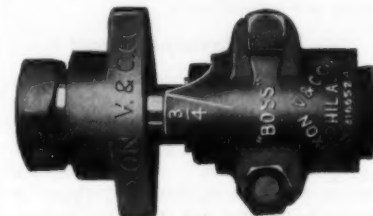
Right: 9-Yard Heavy Duty Heil Rock Body for strip-ping ore from open pit mines near Duluth, Minn.

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Paving Contracts at New National Airport

(Continued from page 25)

optimum moisture for compaction. If the usual four passes were not sufficient to provide a homogeneous mix, the mixing operation was continued. When completed, the area was compacted with rubber-tired rollers weighing 6 to 8 tons per unit, then finished off with a grader to take out the humps and finally compacted, with further sprinkling, by a 10-ton 3-wheel roller. The optimum-moisture content for the mixture was 8 to 10 per cent of water, and the best density secured was 135 pounds per cubic foot.

This surface was primed with RT3 tar, the first portion of the work using 0.45 gallon per square yard, which was reduced to 0.4 and finally to 0.35 and on one area to as low as 0.3 gallon per square yard. The reduction in amount of tar applied was due to the density of the ground, which would not take up more tar. This tar penetrated only from 1/8 to 3/16 inch from the surface. The surface application of tar was allowed to cure for a minimum of 24 hours before starting paving. At all times the U.S.E.D. endeavored to have at least 25,000 square yards of primed subgrade ahead of the asphaltic-concrete paving. The cost of stabilization averaged 50 cents per square yard.

Initial Paving Contract

All paving of runways, taxiways, and aprons was done with two-course asphaltic concrete 3 1/2 inches thick, placed in two layers, a 2-inch base course and a 1 1/2-inch top course. At the ends of the runways, or turn-arounds, where airplanes lock their wheels to make a turn, an asphalt of 85 to 100 penetration was used, while on the runways proper asphalt of a penetration from 120 to 150 was used.

On the initial contract, awarded to Warren Brothers Paving Co., Cambridge, Mass., the contractor was required to furnish the mixing plant, skilled labor and materials, with the exception of the aggregates which had been stockpiled by the dredges, and complete the mixing and laying of the asphaltic-concrete pavements. WPA common labor was furnished by the government. This contract was divided into two periods of construction, the first of 80,000 tons of paving and the second of 1,000 to 60,000 tons of paving, in place.

Warren Brothers used a 5,000-pound-batch twin-pug asphalt plant, producing from 75 to 100 tons per hour. The aggregates were moved from the stockpile to a grizzly by a Carryall scraper and material passing the grizzly was carried up to the top of the plant by a bucket elevator where it was screened and delivered to the storage bins. Material 2 1/2-inch and over was discarded and material from 2 1/2 to 1 1/4-inch was crushed to provide the specified 15 per cent of crushed aggregate used in the

surface course.

The material from the storage bins was drawn on to vibrating screens and thence delivered to the drier where the moisture content was reduced to 1 per cent or less. At the top of the hot elevator another set of vibrating screens graded the material. The aggregates were proportioned in the weighing batcher by using a cumulative dial scale. Mineral filler and asphalt were also proportioned by weight, the asphalt running 5 to 7 per cent of the aggregate for the base course and 6 to 9 per cent for the wearing course. The asphalt was delivered by truck to the plant and pumped into two 10,000-gallon storage tanks.

The hot-mix material was laid down by two Adun mechanical spreaders, working together, laying partially compacted parallel strips 10 feet wide. The asphalt mixtures were compacted by tandem and 3-axle rollers, the latter being used on the wearing course only. Longitudinal rolling was used on the 10-foot strips to within 1 foot of the joint until the adjoining strip was laid. Then diagonal and cross rolling was used, the permitted tolerance being 1/4-inch to grade, and 1/8-inch to smoothness, in 10 feet.

Second Paving Contract

The second paving contract was awarded to Corson & Gruman of Washington, D. C., and involved the laying of 35,000 tons of paving before September 9, 1941. This contractor mixed the asphaltic concrete at his own central mixing plant, located in Georgetown, D. C., a 6-mile haul one way. The asphaltic material was laid by Barber-Greene spreading-tamping-finishing in 10-foot strips widened by hand to 11 or 12 feet as required. The production from the Corson & Gruman plant, spread and compacted, amounted to an average of 800 tons per 12-hour day.

The batches were hauled from the central plant by 10 trucks and delivered to a Barber-Greene machine. In addition to the operator, and behind each machine, were two cutters working on the wings, two rakers, one straight-edge man, followed by two utility laborers for trimming joints and doing other odd jobs, including hand tamping. These men worked under a single foreman. The compaction was done by two 10-ton gas rollers and the final compaction by a 3-wheel Buffalo-Springfield tandem roller.

Safety Striping

Each runway is outlined by Prismo stripes composed of white paint and glass beads to reflect light. There are three white stripes on each edge and two yellow stripes along the center line. The white lines are 6 inches wide and 6 inches apart. The yellow center lines are of similar widths and spacing. Located 1,000 feet from each end of each runway is a group of fifteen 6-inch lines spaced 6 inches apart designed to give the pilot, on take-off and landing, his position on the runway, a definite safety factor to reduce airport accidents.

These runway markings were placed by two D-61 Lewis strippers with single-unit dispensers to embed the minute glass spheres into the binder. These dispensers work directly from the axle of the strippers and do not require their own road wheels for operation.

Personnel

The Washington National Airport was designed by the Civil Aeronautics Authority and constructed under the direction of the U. S. Engineer Department, with J. W. Moss, Engineer in Charge, William W. Sullivan, Chief of Operations, and E. F. McCollum, Chief, Construction Section, U. S. Engineer Department. McIver Rountree was Resident Engineer for the Civil Aeronautics Authority, acting as Coordinator of Operations.

In the first paving operation by Warren Brothers Paving Co. of Cambridge, Mass., H. W. Makemson was Superintendent, while the work of Corson & Gruman, in the second phase of paving, was done under the direction of Edward Costigan, with James Cranford as Superintendent.

Want information on equipment? Write the Editor.

Complete Machinery Buys Dust Control Company

The Complete Machinery & Equipment Co., Long Island City, N. Y., has announced the acquisition of the Kadco Corp., of N. Y. C., manufacturer of dust control equipment for rock drilling. All manufacturing, sales and service of Kadco products will be conducted at Complete's Long Island City plant.

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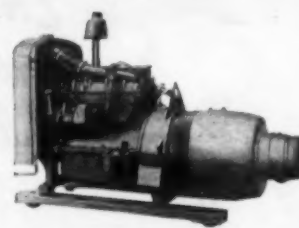
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America's first line of defense is the Navy, and behind the Navy stands its drydocks and supply depots.

It is significant that on every large drydock contract east of the Rocky Mountains the Navy has turned to Butler concrete plants to furnish enormous volumes of concrete at unbelievable speeds. At Charleston, Portsmouth, Philadelphia, Bayonne, Brooklyn, and Boston, Butler plants are working twenty-four hours a day that America may sweep the seas.

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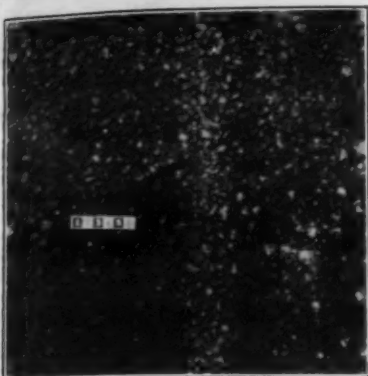


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C. & E. M. Photo
Detail of the road mix on a detour over
Highway H in Taylor County, Wis.

County Maintains State Road Detour

Taylor County Roads Used
For Detour Resurfaced by
County and Maintained for
Heavy Summer Traffic

(Photos on page 44)

ONE farmer on Wisconsin 64 a few miles west of Gilman, when asked about the grading job in front of his house, reported, "It was like a hog wallow last spring, and I hope the County Commissioner don't let the detour go bad while our road is closed". There is little chance of that happening, as during our trip on a Sunday over the detour, Taylor County Road H and a town road, we noted the new coarse-aggregate road-mix surface, and the careful patching of all breaks. The following day, on both trips over the detour, we met the patrol truck and two men at work.

The detour runs for 8.5 miles total length. Starting at the west end of the grading contract, it runs 1.5 miles south on County Road H and then east for the balance of the distance on a town road until it intersects the north and south state highway, No. 73.

It is the policy of the Wisconsin State Highway Commission to oil all detours. The work is done by the County Highway Department and is supervised by the County Highway Commissioner. Knowing that the traffic over this detour would be heavy this summer, W. C. Miller, County Road Commissioner of Taylor County, decided that a 2-inch road mix would be the best protection for the detour. The entire roadway, which is 22 feet wide on Highway H and only 18 feet wide on the town road, was scarified to a depth of 2 inches with scarifier on a No. 12 Auto Patrol and then shot with 0.5 gallon per square yard of SC-3. The binder was then mixed with the power grader until all of the coarse and fine aggregate in the road surface was thoroughly coated. The material was then laid down to a uniform thickness about 2 inches across the road and compacted by traffic.

At the same time this road-mix opera-

tion was carried on on the road, an extra quantity of gravel was road-mixed at the east end of the detour and stockpiled. This material is hauled by Patrolman Walter Panetti, who was in charge of the maintenance of this detour, using a Dodge dump truck. With a helper, the material was carefully placed in all breaks in the road-mix surface to prevent raveling of the roadway.

Asphalt for Rebuilding Strategic Highway Network

This is the subject of a recent bulletin issued by The Asphalt Institute to suggest methods and materials for an economical and adequate program of widening and strengthening the existing roads in the strategic network. Containing a plan showing a method used by several highway departments on old roads and a typical cross section showing hot-mix asphaltic concrete for resurfacing and widening, with photos, text

and other data on the subject, copies of this bulletin as well as other pamphlets on the subject may be secured without obligation direct from The Asphalt Institute, 801 Second Ave., New York City.

New Ditcher Bulletin

The Bucyrus-Ruth ditch excavator, designed for both ditch construction and maintenance, is described and illustrated in a new bulletin, copies of which may be secured by interested contractors and engineers direct from the Bucyrus-Erie Co., South Milwaukee, Wis.

This ditch excavator has eight forward and two reverse speeds; it works on the continuous-digging principle, requiring only one operator and helper; its large crawler tracks provide sure traction over soft ground; and its versatility makes possible economical construction or maintenance of all types of ditches, big or little, wet or dry, according to the manufacturer.



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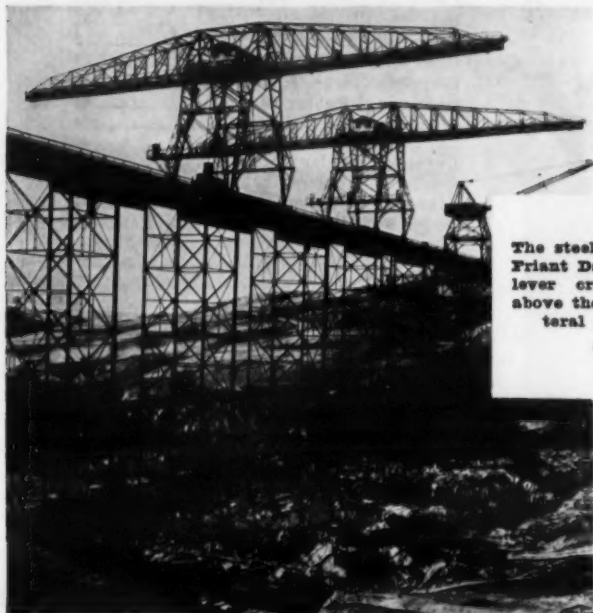
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Contractors and Engineers Monthly



C. & E. M. Photos

Field repair on the A. Guthrie & Co. grading job on U. S. 22 in Pennsylvania. Left, rebuilding a shovel tooth by electric arc welding; center, a general view of the contractor's warehouse and repair shop; right, a repair stall with a Euclid in for an overhaul. Ivar Lindstrom, Master Mechanic, at the right. See page 27.



The steel concreting trestle at Friant Dam. The double cantilever cranes stand 72 feet above the deck and have a lateral reach of 300 feet.

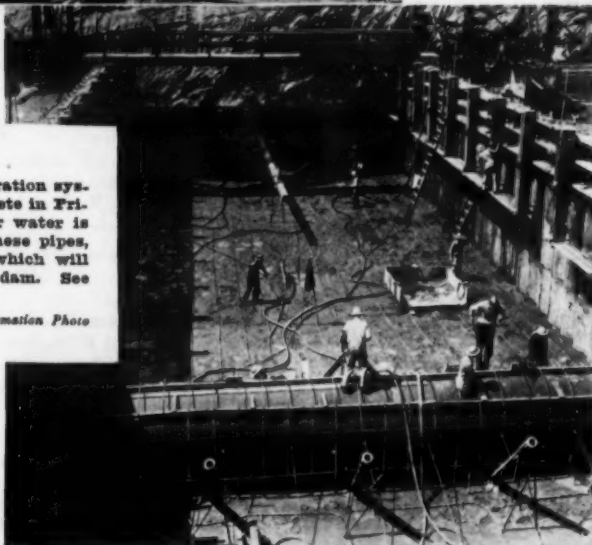
Bureau of Reclamation Photo



These helmeted gunmen are engaged in more peaceful pursuits than many in other parts of the world. Perched on the narrow beams of the Rainbow Bridge over the Niagara River, they are riveting the steel of the arch span joining the U.S. and Canadian shores. See page 6.

A part of the refrigeration system to cool the concrete in Friant Dam. Cold river water is circulated through these pipes, about 800 miles of which will be embedded in the dam. See page 15.

Bureau of Reclamation Photo



C. & E. M. Photo

The complete Pioneer crushing and screening plant set up 6 miles south of Versailles, Ind., to furnish aggregate for a road job on Indiana 29 north of Versailles. See page 9.



A view of the excavation for the Coachella arm of the All-American Canal in southern California, as seen from the top of the 160-foot boom of the Bucyrus-Monaghan. See page 2.



Below, a well-maintained detour around a state highway grading contract in Taylor County, Wis., and at left, the Dodge truck owned by Taylor County and used to maintain this detour over County Highway 11, with Patrolman Walter Panetti and his helper. See page 43.

C. & E. M. Photos



C. & E. M. Photo

The Shepherd Drive underpass before the excavation of the Drive was completed. This structure carries single-track railroad over the Drive. See page 43.